



InnovateUK Energy Catalyst Round 6
Project 105643

“Smart Integrated Community Energy in Northern Tanzania”

Impact and Operations report

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QUIP Impact Survey Methodology

The Qualitative Impact Assessment Protocol (QuIP) is an impact evaluation approach that draws on [Contribution Analysis](#). QuIP studies serve to provide an independent reality check of a predetermined [theory of change](#) which helps stakeholders to assess, learn from, and demonstrate the social impact of their work. QuIP's approach places project beneficiaries' voices at the centre of the evaluation, enabling them to share and feedback their experiences in an open, credible, and respectful way.



The QuIP gathers evidence of a project's impact through **narrative causal statements** collected directly from intended project beneficiaries. Respondents are asked to talk about the main changes in their lives over a pre-defined recall period and prompted to share what they perceive to be the main **drivers** of these changes, and to whom or what they **attribute** any change - which may well be from multiple sources.

Description of QUIP from www.betterevaluation.org

QUIP Semi-structured interview method:

For which sites do we want this impact data?

- Ormoti
- Kiruru
- too soon for others, but we will carry out "lite" standard interviews in Loswaki and Eng'eno School

What impact data do we want to collect?

- Who are our clients/users
(Age, gender, ethnicity, business activities, education, experience)
- How and why is their demand for electricity powered services changing
(Fluctuations in business activities, shocks, demographic and health changes)
- What is their current level of satisfaction with the services they use
(What do they like and dislike? How is their use of services changing?)
- What are the direct impacts of the services on the customers?
(Material impact, changes in knowledge and skills, changing attitudes, changes in the quality of personal relationships)
- What are the indirect impacts of these services on the customers?
(On children within client's household, gender considerations, community activity, competition with other businesses)



Who should do the work?

Ideally use a “blind” researcher – someone who doesn’t know our project, and that the community don’t associate with us. This probably won’t be possible as the community has very few external interventions, so anyone hired will probably be linked back to us. We will also be asking about a timeframe (since solar was installed) that may be very clearly linked to the energy project, even if we choose not to mention the solar directly. The interviewer must be extremely careful not to result in biased responses, ensuring he does not prompt for either positive or negative results.

The interviewer must be skilled in taking notes, and extracting information from an open-ended interview. - It is much more nuanced than a Kobo survey, and the results we get will directly depend on the researchers ability to guide the conversation and ask unbiased, open questions, and record all this information manually in a notebook which he will later translate and write-up digitally.

Sample size

Must be at least ten to draw any general conclusions. Ideally we will go for 15 to make it more manageable. Clients must be selected at random, and include people who are not currently turning up to Ormoti borehole (we want to sample those who are unsatisfied and not attending as well as those who are). We should look to choose our sample based on location.

Semi-structured interview method

Start each section with an initial open question (generative question). Then follow up with supplementary questions where necessary to probe for more detail. Avoid closed questions, especially as they often point to a specific answer.



Kiruru

Kiruru QUIP

Participant name	Gender (M/F)	Connection to project
KR01	M	Village Elder in Kiruru
KR02	M	Salon owner, Kiruru
KR03	F	Service user (not connected to system)
KR04	F	Service user, boma is connected to the energy system.
KR05	F	Service user, boma is connected to the energy system.

Themes overview:

Each of these themes are summarised into the original text in correspondence with the relevant quote from the text.

1. **Access to useful services**
2. **Time saved**
3. **Income generated**
4. **Convenience and ease gained**
5. **Relationships**
6. **Health**
7. **Education**
8. **Felt sense of wellbeing (eg this covers social standing)**

1. <u>Access to useful services</u>		
<u>SUMMARY</u>		
<ul style="list-style-type: none">- 5/5 participants interviewed used the shop for accessing essential supplies and used the charging facilities provided by the system.- 5/5 participants reported that their lives had positively changed as a result of the system being installed.- All participants without direct electricity access suggested connecting all the houses in Kiruru, in order to make the- The system has brought about access to useful services which were not there before.- The milling machine has reduced the journey time for users in Kiruru, who previously has to walk to neighbouring towns in order to access these services.		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'I buy my family's needs like sugar, tea, salt, cooking oil, rice, etc in the shop, also I charge phones, lamps and torches by using the charging service.'</i> <i>'Also the services we get here now since the energy installed (salon, shop, milling machine and charging service are very supportive to us here at Kiruru.'</i>	Access to and utilisation of useful services 5/5 participants interviewed used the shop for accessing essential supplies and used the charging facilities provided by the system.	KR01, KR02, KR03, KR04, KR05
<i>'We are the same now with those who live in towns, as we have enough power to charge our phones, a shop and milling machine, a service that we wouldn't even dream of having here.'</i> <i>'Our life now in Kiruru is so different from before the energy system was installed. Now we have a milling machine a few metres from my house, salon, shop, while before there was only one shop here. Now we even have charging inside our Bomas.'</i>	Improved wellbeing due to access to useful services Stated improved sense of wellbeing due to access to these services. Reported improved change due to close proximity of services, as well as electricity within the household	KR01, KR03, KR04, KR05

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>I can mill maize for my family flour here at Kiruru and I am not going far away like before when I go to Terrat or Makuyuni to find the milling machine.'</i>	The milling machine has reduced the journey time for users in Kiruru, who previously had to walk to neighbouring towns in order to access these services.	KR01-05
<p><i>I propose to connect all people here at Kiruru to the energy system so they can benefit from this project.</i></p> <p><i>I am not connected to the energy system so it costs me to pay charging costs for my phone</i></p>	<p>More connections needed</p> <p>Participants suggested getting all of the community in Kiruru connected to the system, in order for everyone to benefit equally.</p>	KR03
<i>'Also our church was connected to the energy system, so there are no more fuel costs like before when we used a generator.'</i>	<p>Reduced spending on fuel</p> <p>Reduced expenses on fuel due to access to cheaper, clean energy alternatives.</p>	

2. Convenience and Ease Gained		
<p style="text-align: center;"><u>SUMMARY</u></p> <ul style="list-style-type: none"> - The services available through the installation of the system has generated a great of ease and convenience for those living in Kiruru and the surrounding area. - All participants reported switching from kerosene lamps to electrical lamps due to the close proximity of electrical charging services. This has also saved participants money on fuel costs. 		
<u>Key quote</u>	<u>Analysis</u>	<u>Participants</u>
<p><i>'Kiruru now has 24 hours of lighting.'</i></p> <p><i>'Nowadays I won't use fuel (kerosene) lamps and I won't use any cost to buy fuel since I am connected to solar energy.'</i></p>	<p>Access to lighting</p> <p>Kiruru has 24-hour access to lighting, resulting in the phasing out of Kerosene lamps.</p>	KR01, KR03, KR05
<i>'Kiruru was previously a very difficult place for people to get these services, which we have now here. It was a very long distance to walk to Terrat, Makuyuni, Komolo or Arusha for these services. But now, myself and this community feel like we are in Europe, and we are proud to see that people from neighbouring villages are coming here for the salon, charging service, shop and milling machine here at Kiruru.'</i>	<p>Improved wellbeing</p> <p>Improvement of wellbeing due to convenient access to services</p>	KR02, KR03, KR05

3. Time saved

SUMMARY

All women interviewed said that access to the milling machine in Kiruru saved them time.

Prior to the system being installed, women had to walk to Terrat or Makuyuni to access a milling machine service. This journey took a long time, and often led to them returning home late and in the dark. After the energy system was installed, access to a milling machine, salon, charging services and the shop has meant that this travel time has been greatly reduced- and is now only a few minutes for those living in Kiruru.

Key quote	Analysis	Participants
<p><i>'I can now mill maize for my family here in Kiruru and I am not going far away like before when I had to go to Terrat or Makuyuni to find the milling machine. So I can get maize flour early and come back home.'</i></p> <p><i>"I can boil water for cooking ugali (stiff porridge) and run to the milling machine to grinds maize and come back quickly before the water is boiling"</i></p>	<p>Reduced time travelling to services</p> <p>Previously, milling services were far away in other villages, but now they are very close to many bomas, meaning that travel time for many women and men in the community is reduced to only a few minutes.</p>	
<p><i>The project has reduced many financial costs and time, as we used to have to find different services far away out of Kiruru.</i></p> <p><i>Now we have a milling machine a few metres from my house, as well as having a salon and a shop, whereas before there was only one shop here and now we even have charging services inside our bomas (houses).</i></p> <p><i>The project has been supportive to us because it reduces the long distance to go to Terrat or Makuyuni and time we use to find the services we are getting here now.</i></p> <p><i>'The milling service is very supportive to me and the other women who previously faced the challenge of walking long distances to find this service.'</i></p>	<p>Improved access to useful services</p>	<p>KR01, KR02 KR03, KR04, KR05</p>

4. Income generation		
<p style="text-align: center;"><u>SUMMARY</u></p> <p>All participants interviewed said that this project had saved them financial costs due to no longer having to spend money on transport required to access services e.g. milling, salon, shops etc.</p> <p>3 of 5 participants interviewed have been able to make an income from the system.</p>		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'My family 's livelihood situation has been different since I started providing the charging services and generating a small income for my family needs.'</i>	<p>Increased income from business owners</p> <p>The business owners have reported making more money, which has in-turn enabled them to better provide for the needs of their families</p>	KR01

5. Education		
<p style="text-align: center;"><u>SUMMARY</u></p> <ul style="list-style-type: none"> - All participants reported improved performance of their children in school, due to light being available to them at night, which has meant that their children are able to complete their homework at night time. - The installation of the energy system attracted further investment from the government in the school. 		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<p><i>"My two children passed their standard seven examination in 2021 and now they are at secondary school. The younger brother of them is in standard 7, and he is doing well. The secret of this success is night preparation at home because we have light".</i></p> <p><i>'Now our children who are students are reading, writing and doing their homework during the night as there is light/power in the Boma.'</i></p>	<p>Improved performance of pupils</p> <p>Improved attainment in school due to children having access to light at night. Children now able to complete school work at home, which in-turn has started to improve attainment</p>	
<p><i>'The classroom in our school has finished building through the collaboration of project management and Kiruru's community.'</i></p> <p><i>Because of this project we are looking to build a primary school here and not just a nursery school (as we thought before) and we are starting to build a Teacher's house.</i></p>	<p>Increased government school investment</p> <p>Increased government investment in the community primary school, partially due to the project</p>	

6. Relationships

SUMMARY

- All respondents interviewed said that this project had improved relationships within families.
- Those with businesses said that there had been positive changes in their family, and felt that they are now able to participate in family discussions due to having a source of income running charging services
- The status of Kiruru among other neighbouring villages and sub-villages has changed due to the increase in services available, and was perceived as a hard place to live before the system was installed.

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<p><i>'There were relationship changes in my family as now I can support my family to get different needs effectively since I provide charging service and get income.'</i></p> <p><i>'Now I am not depending on my husband for family needs as I can afford to buy food and other needs for my family through the charging service.'</i></p> <p><i>'I participate to discuss my family issues, especially on how to use a small amount I earn from charging service.'</i></p>	<p>Financial empowerment and independence of women</p> <p>Status of women in the community has improved</p>	KR01
<p><i>'Since the energy system was installed, Kiruru has become popular among other sub-villages within this area.'</i></p> <p><i>'Kiruru now has an identity, as it has lighting outside the national electric grid [many people of neighbourhood villages before had seen Kiruru as a hard place to live before these services, no one wanted to live here. But after the project, many people can invest in [Kiruru].'</i></p>	<p>Improved status of Kiruru relative to other sub-villages</p> <p>Improved status of Kiruru as a sub-village within the district due to there being more services available.</p>	KR01, KR05



7. Health		
<u>SUMMARY</u>		
<ul style="list-style-type: none"> - Community members reported having more money to afford health services as a result of being able to generate an income from the system. - All respondents reported still have to travel far to access health services, and highlighted the need for basic health services nearby. - Overall, whilst the system has enabled users to generate more income, which has in-turn enabled them to afford health services, there are still no basic health facilities near Kiruru, so they still have to travel far to seek medical assistance. 		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
'Through this services I generate income that supports me to afford to buy my family needs, like; clothes, food, farm cultivation, to pay health services'	Able to pay for health services Increased income generation has enabled community members to pay for health services.	KR02, KR03, KR05

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
'There are no health services at Kiruru, so we must still travel a long distance to find health services. We still have to go to Terrat, Makuyuni, Komolo or Arusha for these services.'	Request for improved health services in Kiruru Community in Kiruru still have to travel far to gain access to basic healthcare services. This is something that needs to be improved.	KR01, KR03,

8. Felt sense of wellbeing		
<p style="text-align: center;"><u>SUMMARY</u></p> <ul style="list-style-type: none"> - Participants reported feeling more safe due to light being available at night, which in-turn protects their livestock due to being in the light. - The convenience of the milling machine being nearby has enabled 		
<u>Key quote</u>	<u>Impact Analysis</u>	<u>Participants</u>
<i>'My livestock now are no longer in darkness as I put lights in my boma to light out for my livestock protection from wild animals and people attacks.'</i>	Improved wellbeing/ safety of livestock Reported increase of wellbeing and security of livestock due to lighting at night, which has improved livelihood security.	KR01, KR04
<i>'During the rainy seasons before this project, we often ended up sleeping without eating, as we didn't have a milling machine service and it was impossible to go across the river in the rain to get to Terrat or Makuyuni for the milling service.'</i>	Improved safety The system has stopped women having to make dangerous journeys to milling services.	KR01, KR03, KR04,
<i>'My family are so happy and enjoy life as they have enough power in the boma for charging phones, lamps, torches, lighting inside the house and outside.'</i> <i>'Our life now in Kiruru is so different from before the energy system was installed. Now we have a milling machine a few metres from my house, salon, shop, while before there was only one shop here. Now we even have charging inside our Bomas.'</i>	Improved wellbeing due to services Convenience and wellbeing of those in the community has greatly improved.	KR04, KR05

Kiruru impact stats

			notes
Operational data	Energy generated	1,515 kWh	
	Carbon	2.39 tCO ₂ e	
Electricity connections	How many people connected (total number of people living in bomas that are connected)	77	1. Chairmans boma: 25 people 2. Jeremia: 15 people 3. Magdalena: 15 people 4. Sarim Kisioki: 17 people 5. Boma beyond Magdalena's: 10 people
	Students with power	48	1. Nursery: 36 (not yet connected), 2 teachers 2. Primary: 48 (connected), 1 teacher
	Churches attendees	200	1 church = 200 people
Businesses stimulated	No. of businesses using system (note if a shop does salon + phone charging, count it as two businesses)	14	Bariki – barber, phone charging Nemburis – salon, tailoring, phone charging, music Chairperson – shop, phone charging Old shop – TV New salon – salon, shop, phone charging Alais – milling Jeremiah – phone & torch charging
	No. jobs created (include those who are employed)	14	1. Bariki's salon: Bariki + employee 2. Chairpersons(Lomnyak Kiteho) shop: chairperson+ employee 3. Old shop: owner +2 employees 4. New salon: owner + employee 5. Alais milling machine: Alais & assistant 6. Nemburis shop: Nemburis + 2 sons
	No. of customers served by businesses	1,440	1. Salon at incubation hub, when Bariki was running it: gets TSh 30,000 most of the Sundays, averages 100 customers a month 2. Chairman's shop: averages 50 customers per month 3. Old shop: shop averages 140 people per month. 30 people would watch the biggest football match in Tanzania. There are football matches on most week ends 4. New salon: get Tsh 15,000 on most Sundays. It averages 70 people per month 5. Kiruru milling machine has average of 51 customers per week from Dec 21 to April 22. People tend to mill on a weekly basis, so this is probably the total number of customers served.
	Number of sub-villages served by businesses	3	
	Maximum distance travelled by customers to reach service	7km	



Ormoti

Ormoti QUIP

Themes overview:

Each of these themes are summarised into the original text in correspondence with the relevant quote from the text. You can find the raw data spreadsheet with all quotes [here](#).

1. Access to useful services
2. Time saved
3. Income generated
4. Convenience and ease gained
5. Relationships
6. Health
7. Education
8. Felt sense of wellbeing (eg this covers social standing)

Participant count: 12

<u>Participant name</u>	<u>Gender (M/F)</u>	<u>Connection to project</u>
OR01	F	Service user
OR02	F	Service user
OR03	M	Service user
OR04	M	Service user
OR05	M	Service user
OR06	M	Service user
OR07	F	Service user
OR08	F	Service user
OR09	F	Service user
OR10	M	Service user
OR11	M	Facility employee
OR12	M	Facility employee

1. Access to useful services		
<p style="text-align: center;"><u>SUMMARY</u></p> <ul style="list-style-type: none">- Ormoti has improved access to useful services for individuals living close to the facility.- Prior to the facility being in place, customers had to walk to Terrat, Sukuro or Nadonjukin in order to access these services- a journey which could take up to [4 hours.]- Business owners have been able to offer customers a range of useful services, such as phone charging, maize milling and refrigeration, due to the electricity available on site.		
<u>Key Quote</u>	<u>Analysis</u>	<u>Participants</u>
<i>I get my family's home needs, like; soap, rice, sugar, salt, tea, soda, juice, biscuits for children, vegetables, etc at Ormoti shop, so we don't go far away as we went previously to find these services.</i>	<p>Convenience of services utilised</p> <p>All participants used the shop to buy basic supplies, which were previously difficult to access.</p> <p>Customers had to walk to Terrat, Sukuro or Nadonjukin in order to access these services</p>	OR01, OR02, OR03, OR04, OR06, OR07, OR08, OR09, OR10, OR11, OR12

<u>Key Quote</u>	<u>Analysis</u>	<u>Participants</u>
<i>'I use this service to charge my phone, my customer's phones and soft drinks fridge'</i>	Increased range of services available For business owners at Ormoti, access to electricity has increased the number of services available to customers, such as refrigeration and charging facilities	OR11, OR12
<i>'Also we as women, we work a short distance to get water and go back home early for other family activities than before.'</i> <i>'Also water service before this project had made me and other women walk a long distance to find this important service in our life, but now it is different as I get this service in a short distance.'</i> <i>"For sure, the project has freed us from the slavery of finding water a long distance away"</i>	Reduced journey time to basic services The borehole in Ormoti has reduced the journey time for those collecting water. The job of water collection is typically performed by women in this context, hence the presence of the water service in Ormoti has been especially beneficial to women, due to greatly reducing the journey time.	OR01, OR02, OR07, OR08, OR09 [All female respondents]

2. Convenience and ease gained		
<u>SUMMARY</u>		
The system has generated greater convenience and ease for those living in a close proximity to Ormoti. This is due to essential services (such as water, milling and a shop) being in a closer proximity to individuals than before. Ormoti has reduced journey time and money for those using the facility.		
<u>Key quote</u>	<u>Impact Analysis</u>	<u>Participants</u>
<i>'Before the energy system was installed, the water service was costing me and my family a lot, because I had to hire a motorcycle or tractor to bring water from Terrat or Komolo for domestic use and livestock'</i> <i>'Now I am not afraid or worried about water use in my family because I can ride my bicycle or donkeys and get water from a nearby distance at an affordable price.'</i>	Money saved on transport Participants have saved money on transportation costs, such as a motorbike ride, which were previously necessary in order to access these basic services.	OR01, OR02, OR03, OR04, OR06, OR07, OR08, OR09, OR10, OR11, OR12
<i>'There is no more fuel usage in my family household as I stopped using Kerosene lamps, because I can charge my lamps and torches in Ormoti for home use at night.'</i>	Kerosene replaced with clean energy Users no longer have to use kerosene lamps inside their house, which are costly and can be dangerous, and now use electric lights which can be charged at Ormoti.	OR01, OR02, OR03, OR04, OR05, OR06, OR07, OR08, OR09, OR10, OR12

3. Time saved		
<p align="center"><u>SUMMARY</u></p> <p>Ormoti has saved time and costs for users due to services being in a closer proximity to their homes.</p>		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>"The project in general had saved our time and reduced costs that we us last time to follow those services at Terrat, Sukuro and Nadonjukin"</i>	<p>Saving time</p> <p>Users of the system have saved time due to the services being in a close proximity to their Bomas, meaning that travel time is saved. It has also saved money which would have otherwise been spent on transportation to access these services.</p>	OR01, OR02
<i>'Also we as women, we can now walk a shorter distance to get water and are able to go back home early for other family activities. For sure, the project has kept us free from the slavery of finding water from far away.'</i>	<p>Time saved for women</p> <p>This service has been especially useful for women in the surrounding community, due to the solar-powered borehole reducing travel time for water collection (traditionally an activity carried out by women).</p>	<p>OR01, OR02, OR07, OR08, OR09</p> <p>[All female respondents]</p>

4. Income generation		
<p align="center"><u>SUMMARY</u></p> <ul style="list-style-type: none"> • The system has created employment opportunities for individuals in nearby communities, for example running shops and water services. • The water system has enabled livestock owners to take better care of their livestock through providing drinking water for them, which are often the central means of individuals making money. • The veterinary shop at Ormoti has also increased accessibility to medicine for livestock, meaning that livestock owners are able to take care of their livestock, due to the accessibility of medicine 		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'My livestock are healthy now as they get and drink clean water and I vaccinate quickly once I see symptoms of any disease, we get veterinary service here at Ormoti'</i>	<p>Improved health of livestock</p> <p>The system has enabled users to take better care of their livestock through:</p> <ul style="list-style-type: none"> i) Access to clean, affordable drinking water ii) Veterinary services available at the project <p>This has in-turn improved the health of livestock and increased the income of livestock owners.</p>	
<i>'Now I have more time to generate an income as I have a chance to do a small business near my family boma for my family's future because I have that chance now.'</i>	<p>Income generating opportunities</p> <p>Participants reported having more time to start up small businesses</p>	OR01



5. Education		
SUMMARY		
<p>Users of the system have been able to save transport money, which was previously spent to access basic services, to spend on school supplies for their children.</p> <p>School attendance has improved due to the water enabling users to wash their clothes more regularly, which has made children more willing to go to school.</p> <p>Business owners have been better able to afford school fees, due to their increased income, as well as being able to afford school supplies for their children.</p>		
Key quote	Impact analysis	Participants
<i>'The costs that I use to hire a motorcycle for water service now I can use it to buy pens, notebooks, socks, pencils for my children who are in school'</i>	<p>More money for school supplies</p> <p>Money which was previously spent on transportation costs for accessing services is now being used to provide more school supplies.</p>	OR02, OR06, OR08, OR09, OR10, OR11, OR12
<i>'Our children are now going to school with clean uniforms and smart as they have clean water to clean their bodies and they fetch it from a close distance. So they aren't afraid to go to school with dirty uniforms like they did before the system was installed'</i>	<p>Improved attendance</p> <p>Due to improved access to water, children are now able to have their uniforms washed and go to school with clean uniforms.</p>	OR01, OR02, OR03, OR04, OR06, OR08, OR09, OR10,

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'I can afford to pay school fees for my children in local schools and those who are in the English medium.'</i>	Business owners able to afford school fees Those running businesses at Ormoti now have additional income to pay for the school fees of their children, meaning that they can continue to receive an education.	OR11, OR12

6. Relationships		
<p style="text-align: center;"><u>SUMMARY</u></p> <p>All participants reported that their family relationships has improved since the installation of the energy system</p> <ol style="list-style-type: none"> 1. Women and men being home earlier due to the close location of the borehole and services, leading to less miscommunication and conflict. 2. Families having their needs met due to close proximity of useful services 3. Charging facilities and electricity access has led to better communication between families, due to mobile devices being charged, leading to less conflicts due to miscommunications. 		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'The relationships and status of individuals within my household had improved and sustain as women and men getting their family need together at one place in short distance from home and back home together early'</i> <i>'Also the saved amount I used before for water service now I use it for family needs, so the project sustains our families relationship.'</i> <i>I get enough time to talk with my husband about family issues during the day and we even walk together to the farm, which means our children progress. These changes have occurred after the energy system was installed and other services.</i>	Improved family relationships 12/12 participants said that their family relationships has improved since the installation of the energy system <u>This was mainly due to:</u> <ol style="list-style-type: none"> 1. Women and men being home earlier due to the close location of the borehole and services, leading to less miscommunication and conflict. 2. Families having their needs met due to close proximity of useful services 3. Charging facilities and electricity access has led to better communication between families, due to mobile devices being charged, leading to less conflicts due to miscommunications. 	All
<i>'My employment has sustained my relationships and status within my household as now I can afford to fulfil my family's needs on time and make my wife and children happy, so no conflicts in the families.</i>	Providing for families Participants (Male) that are employed by the system (e.g. running the shop) noted improved family relations due to being better able to provide for their family needs, which has in-turn improved their relationships.	OR11, OR12



7. Health		
<p style="text-align: center;"><u>SUMMARY</u></p> <p>Respondents reported health improving as a result of the system being in place due to:</p> <ul style="list-style-type: none"> i) access to clean water as a result of the water system being in place ii) Access to nutritious food in the dry season due to the vegetable service <p>Respondents also requested access to basic healthcare services at the facility, as they still have to travel far to gain access to these services.</p>		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'Now we clean our bodies and clothes more frequently than before and we drink clean water, so we are now far from water borne diseases.'</i>	<p>Access to clean water</p> <p>Family hygiene has been said to have been improved due to access to clean water for washing clothes, bodies and drinking, avoiding water borne diseases.</p>	OR01, OR03, OR04, OR06, OR07, OR09, OR011, OR12
<i>The vegetable service has made our health better, especially during the dry season because there was no milk so we used vegetables and we got that service close by at an affordable price.</i>	<p>Access to nutritious food</p> <p>8/12 participants reported improved health due to access to vegetables available in Ormoti, especially during the dry season.</p>	OR02, OR03, OR05, OR06, OR07, OR08, OR09, OR10
<i>'I have a suggestion to project supervisors to establish Pharmacy service here at Ormoti as we are living far from this service and it costs us to follow this service at Sukuro, Komolo, Terrat and Arusha.'</i>	<p>2/12 participants have requested Pharmaceutical services at Ormoti.</p>	OR03, OR06

8. Felt sense of wellbeing

SUMMARY

- Participants reported an improved sense of wellbeing as a direct result of the project, due to it increasing access to useful services.
- The project has developed relations between different communities due to them using the same facilities

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'We feel like other people in the world now, whereas before we felt that we were just people who lived in the desert. The project has satisfied me and my life since it has been here.'</i>	Improved quality of life Participants reported feeling as though their quality of life has improved, as well an increased sense of life satisfaction.	OR01, OR04, OR05, OR09, OR11, OR12
<i>'[The system] has built a relationship with our neighbouring communities who come here to find water, for example; people and livestock from Nemashon, Majanga, Katikati, Sukuro, Nadonjukin, Terrat, etc. So we are interacting with other people because of this energy system installation'</i>	Improved relations with other villages The project has developed relations between different communities due to them using the same facilities	
<i>'Water has brought the most changes to us since the energy system was installed. Water is my first priority service, because I can't cook anything without water.'</i>	Water as essential service Respondents articulating the fact that water is their first priority for meeting the most basic of needs e.g. gaining food, hygiene, hydration etc.	OR01, OR04, OR05, OR06, OR09, OR11, OR12



Ormoti impact stats

			notes
Operational data	Energy generated	23,267kWh	
	Carbon	36.76tCO2e	
Businesses stimulated	No of businesses on site	11	human and cattle water, grocery shop, salon, phone & torch charging, milling machine, milk collection centre, vet shop, animal treatment, market garden, snacks
	No. jobs created (include those who are employed)	6	2 permanent, 4 temporary
	No. of customers served by businesses	4,950	
	Number of sub-villages served by businesses	10 sub villages from 3 different villages	
	Maximum distance travelled by customers to reach service	15km	



Loswaki

Loswaki QUIP

Participant count: 4

Participant name	Gender (M/F)	Connection to project
LS01	M	Member of CBWSO
LS02	F	Customer
LS03	M	Customer
LS04	F	Member of CBWSO

1. Access to useful services

SUMMARY

- Half of participants interviewed reported using the electricity service (Perhaps confusion surrounding electricity service vs water service)
- All reported using water service, hence were actually using the electricity service.
- Increased reliability of access to water due to the water system being reliable: previously had between 3-7 days of no water due to frequent gen-set breakdowns

The water is being used for the following purposes:

- Irrigating produce for domestic farming e.g. growing vegetables and fruit
- Domestic use (unspecified but assuming washing, cleaning etc.)
- Drinking water for Livestock

Key Quote	Analysis	Participants
'We use the electricity service for pumping water for community domestic use and livestock.'	All reported using water service, hence this service is perceived as useful by participants	LS01, LS02, LS03, LS04
'Now, I use water for domestic use and I irrigate my garden, as we get this service more effectively than before since solar was installed here.'	Irrigating produce for domestic farming (vegetables and fruit)	
'The energy system has brought new hope and happiness to Loswaki Village Community since it was installed. It has stopped us from water suffering and now I can fetch water near my house door as you see there. (He points to the water tap in his house compound when he is laughing with great happiness...).'		
'Since the Solar was installed, the water service here was more effective than before when we were facing fuel costs and generator damages, so the community missed water for three (3) and up to seven(7) days.'	Reduced fuel costs and more reliable water supply	

2. Convenience and ease gained

SUMMARY

Improved compared with earlier diesel-powered practice

Key quote	Impact Analysis	Participants
'Since the Solar was installed, the water service here was more effective than before when we were facing fuel costs and generator damages, so the community missed water for three (3) and up to seven(7) days.'	Increased reliability of access to water due to the water system being reliable: previously had between 3-7 days of no water due to breakdown of diesel generator.	

Key quote	Impact Analysis	Participants
<i>'It is unbelievable that water domestic points (DPs) are now in the household (Boma) so the community gets water services nearby.'</i>	Convenient domestic water placement Water DPs (domestic points) mean that the water is conveniently located in bomas	
<i>'We are thankful to OMASI and Smart Village for this support, which has terminated water challenges in Loswaki Village.'</i>	Improved reliable water access The price of water has not increased, but the reliability of the service has increased drastically, meaning that the community is able to access water at the same cost as before.	

3. <u>Time saved</u>		
<u>SUMMARY</u>		
Improved time savings due to the increased reliability of water supply		
Key quote	Impact analysis	Participants
<i>'I can now fetch water from a short distance away and I get enough time to save my family or go to the farm and participate in development activities rather than before when I used the whole day to find water and sometimes I couldn't get it.'</i>	Time saved from reduced distance travelled Time saved due to reduced amount of time spent searching for water from other far away sources	
<i>'Women are no longer walking a long distance to find water as they get it in water at domestic points nearby their households.'</i> <i>'The energy system had been very supportive to the Loswaki community, especially women who had spent a lot of time walking a long distance to find water.'</i>	Time saved by women Women reported reduced time spent going to fetch water: this has been the case across the board, but especially for women	

4. Income generation

SUMMARY

Increase in business activities available since project has been implemented:

- Individuals interviewed started gardens, in which they grow produce to sell
- Selling produce (e.g avocados, guavas, lemons etc.) from their own farms & selling produce to earn money for their families

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'The project creates an opportunity of generating income for individuals after starting gardens of vegetables, flowers, Fruits and tomatoes.'</i>	Increase of income generation opportunities	
<i>'Since the Solar was installed in Loswaki, water service here has been more effective than before and I established a business of selling water, which I earn an income for my family needs from.'</i>	Income generation opportunities for women	

9. Education

SUMMARY

No connection made in interviews

10. Relationships

SUMMARY

Reduction in community water-conflicts, and improved quality of family relationships due to increased availability of time.

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'Now we can participate in family and community development activities because we don't worry about water services and the distance of getting water.'</i>	More time to focus on: family issues & community related development issues	
<i>'There are no longer any conflicts concerning water service in the community.'</i>	Improved community relations due to improved water availability reducing community conflicts.	



11. Health

SUMMARY

The system has improved the health of the community in the community due to:

- Reducing water borne diseases
- Improved domestic hygiene due to being able to wash, clean
- Access to clean drinking water
- Less long distances to walk for water, which was flagged as a hazard to health due to dehydration and fatigue.

Livestock health reported as improved due to:

- Reduced walking distance of livestock to water source
- Improved quality of drinking water: no longer drinking from contaminated sources such as dams.

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'Community health has improved and there are no water borne diseases as we can now treat the water several times.'</i>	Reduce instance of water-borne diseases	
<i>'Community livestock health is good now as they no longer have to walk a long distance to find water.'</i> <i>'Livestock have a shorter distance to walk to find water, so they no longer stop to drink in dams water/unclean water.'</i>	Improved health of livestock Due to no longer having to drink contaminated water from dams or walk a long distance find to find an alternative water source.	
<i>'Household's hygiene is better than before the system was installed.'</i> <i>'No more dam's/ river's water drinking at Loswaki village.'</i>	Improved household hygiene Hygiene has improved due to domestic water points and easy access to water for washing and also no longer having to	

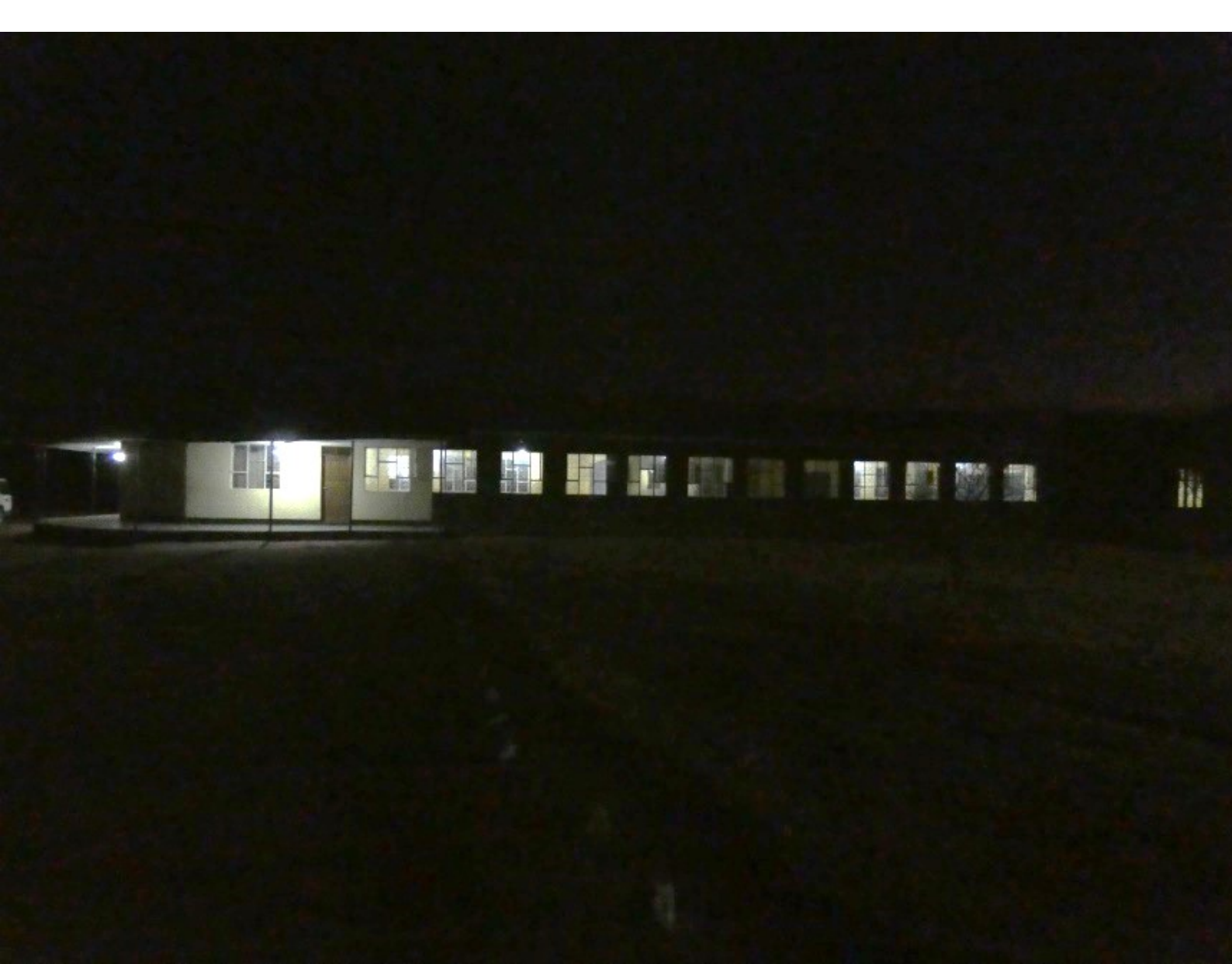
12. Felt sense of wellbeing		
SUMMARY		
Key quote	Impact analysis	Participants
<p><i>'I have started a garden with fruit trees and I get avocados, guavas and lemons, which I sell and get money from, which has happened after we got this effective water service.'</i></p> <p><i>'My house compound is green with an attractive environment after planting trees from getting water points within my house.'</i></p>	<p>Improved environment</p> <p>More plants being able to survive and more vegetation in the community due to increased access to water</p>	
<p><i>'Since the energy system has been installed, community members, other members of CBWSO and I are more relaxed than before, as we struggled to get water when the generator got damaged or there was no fuel (diesel).'</i></p> <p><i>'It solves all the challenges we had faced before as CBWSO Members in water supply management. Now we relax!!'</i></p>	<p>Decreased water scarcity anxiety</p> <p>Due to increased reliability of water, there is less anxiety and concern in the community about not getting water.</p>	
<p><i>'Now women and men can participate in development activities and go to the markets for family needs without fearing to miss water service before and after they come back.'</i></p>	<p>More time for family and community activities</p> <p>This is because of the</p>	
<p><i>'It has stopped us from water suffering'</i></p>		





Loswaki Impact statistics

			notes
Operational data	Energy generated	6680 kWh	
	Carbon	10.55 tCO2e	
Businesses stimulated	No. of businesses using system	2	human water, cattle water (milling machine to be added)
	No. jobs created (include those who are employed)	7	
	No. of customers served by businesses	10,400	
	Number of sub-villages served by businesses	7	
	Maximum distance travelled by customers to reach service	9km	



Eng'Eno School

Eng'eno QUIP

<u>Participant name</u>	<u>Gender (M/F)</u>	<u>Connection to project</u>
<u>EN01</u>	M	Teacher
<u>EN02</u>	F	Teacher
<u>EN03</u>	M	Teacher

1. Access to useful services		
<p style="text-align: center;"><u>SUMMARY</u></p> <ul style="list-style-type: none"> - All teachers interviewed reporting making use of the electricity services that have been made available at the school, as a direct impact of the system being installed. 		
<u>Key Quote</u>	<u>Analysis</u>	<u>Participants</u>
<i>'I use the Electricity service for lighting at home, classrooms and dormitories during night here at School and also for phone and laptop charging, printing and for laboratory equipment.'</i>	<p>All respondents reported making use of the electricity services. These included:</p> <ul style="list-style-type: none"> - lighting at home - Classroom lighting - Laptop charging - Printing - Laboratory equipment - Phone charging 	EN01, EN02, EN03

5. Convenience and ease gained		
<p style="text-align: center;"><u>SUMMARY</u></p> <p>Respondents reported the electricity services have enabled them to charge their devices (e.g. laptops and phones), and gain access to entertainment, such as TV on campus.</p>		
<u>Key quote</u>	<u>Impact Analysis</u>	<u>Participants</u>
<i>'Now I can watch TV here, at home on the school campus, or I can use my phone with full charge to access information/news from all over the world.'</i>	Useful services conveniently located on campus	
<i>'I can charge my phone and laptop within the school campus without any costs rather than before when I must walk more than 3(three) kilometres to the Village for charging service.'</i>	<p>Reduced walking distance to charging services</p> <p>Previously, teaching staff had to travel 3kms to access charging services. This has now been reduced to zero due to electricity being available on campus.</p>	

6. Time saved		
<p style="text-align: center;"><u>SUMMARY</u></p> <ul style="list-style-type: none"> - The energy system has saved the time of teachers, due to electricity services now being located on campus. Prior to the system being installed, teachers had to travel to other villages in order to access these services. - Teachers and pupils also have more time to work at night due to access to lighting. 		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'Since the energy system was installed, my colleagues and I have enough time to prepare our notes and other office reports- even at night- as we have more power than before.'</i>	<p>Increased available working time</p> <p>Teachers have more time to work at night due to access to electrical lighting</p>	

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'The energy system saved our time which we had previously used to go out of school campus for a charging service which was costing us money'</i>	Transportation time reduced Time has been saved on transportation to electrical services, such as phone and laptop charges.	
<i>'This energy system has terminated the long distance we walk from school to the Village for charging service'</i>		

7. Money saved		
<p align="center"><u>SUMMARY</u></p> <p>Participants reported saving money, which was previously spent on transportation to access these services.</p>		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'The other teachers and I have started saving the amount that we had been using before to hire the motorcycle to go to Sukuro or Terrat for phone or Laptop charging.'</i> <i>'The energy system is reducing the costs we had used for printing.'</i>	Money saved on transport Teachers reported saving time, which was previously spent on travelling to access these services.	

8. Education		
<p align="center"><u>SUMMARY</u></p> <ul style="list-style-type: none"> - The electricity services have had positive impacts on the education of pupils, as they have more time to complete their homework assignments due to the increase of hours they have to complete work due to access to lighting - This has in-turn improved attainment in classes - Now have the same access to lighting as schools that are connected to the grid - Teachers have now set up self-study groups as a result of 		
<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'The Education situation has changed; students themselves enjoy their subjects as they have effective power to do their assignments and self-studies at night.'</i>	Electricity improving education satisfaction for pupils The education situation has improved for students, as they can study at night, and in-turn get more satisfaction from their education.	
<i>'Students passing performance has increased in this short moment and we are looking forward to further increases.'</i> <i>'It improves students' performance as they have enough time for self-studies and night preparations (Studies).'</i>	Improved attainment Improved attainment in school due to access to electricity, as available study time has increased to after sunset.	

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'The education situation has changed, as we can have class night sessions and night self-studies or group discussion.'</i>	Increased study time Pupils now have more time to study due to access to electrical lighting being available in the evenings.	

13. Health

SUMMARY

All participants reported an improvement of health, due to:

- light reducing the risk of eye problems for teachers and pupils due to them having to work in poor lighting conditions at night
- Having access to light at night (from the installation of the system) was reported to have improved this issue

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>Students' and Teachers' health has improved, as there were no eye problems because it is light enough to work at night, compared to before when the light is very dim/weak.</i>	light reducing the risk of eye problems for teachers and pupils due to them having to work in poor lighting conditions at night	

14. Felt sense of wellbeing

SUMMARY

<u>Key quote</u>	<u>Impact analysis</u>	<u>Participants</u>
<i>'Students and Teachers are not as stressed as before when the school turned dark when the lights went off at 8 or 9 PM'</i>	Reduced stress Due to the campus no longer being in darkness at night, respondents reported feeling less stressed	
<i>'We have been preparing and eating our food in a well-lit environment since the energy system was installed.'</i>	Improved living conditions Respondents were able to eat and prepare food in good lighting conditions.	
<i>'Now I can watch TV here, at home on the school campus, or I can use my phone with full charge to access information/news from all over the world.'</i>	Access to entertainment Respondents have more entertainment facilities on campus, which they reported to improve their wellbeing and enjoyment of being on campus.	



Eng'eno Impact Stats

			notes
Electricity connections	How many houses connected	13	Teachers houses and school buildings have been connected
	Number of students with power	210	



Overall Operational Data

	kWh produced	tCO2e avoided
Site	Cumulative	Cumulative
Ormoti (single phase)	2,133	3.37
Ormoti (three phase)	21,134	33.39
Kiruru	1,515	2.39
Loswaki borehole	6,680	10.55
Mwrrk borehole	2,017	3.19
Engii	50	0.08
ORS FM community radio	17,233	27.23
Terrat Borehole	11,087	17.52
OMASI Borehole	2,150	3.40
Solar Boma System	238	0.38
Terrat Dispensary	289	0.46
EngEno School	400	0.63
Total	64,926	102.58



Impact statistics: Overview of all sites

Site	Jobs created	People in community impacted	People connected	Businesses connected	Wider beneficiaries
Ormoti Biz hub	6	4,950	-	11	
Kiruru Incubation Hub	14	1,440	77	14	
Loswaki Water	7	10,400	-	2	
Mowrrk water	3	2,000	-	2	
EngEno School	-	210	230	1	
Engii Energy Hub	1	300	60	1	
Flora's Borehole	2	3,000	-	3	
Hostel Borehole	1	500	-	4	
ORS FM	15	-	-	2	500,000+
Mama Alais' boma	-	15	15	-	
Dispensary Energy System	-	-	-	1	14,000
TOTAL	49	22,815	382	41	