

Real Time Evaluation Report

PESITHO ECOCA Pilot

Myanmar, 30st April – 3rd May 2019



Student from Aarhus University doing baseline validation in Kapaung Pin village in March 2019.

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Introduction

The Real Time Evaluation (RTE) was conducted six weeks after the start of the field test pilot of the ECOCA electrical solar cooker developed by the Danish start-up company PESITHO. The pilot is taking place in two villages of Myanmar, Kapaung Pin and Kapen, targeting IDPs and is a collaboration between PESITHO and Caritas Denmark in conjunction with the local operational partner Caritas Myanmar/KMSS. The pilot runs from mid-March until mid-June 2019. PESITHO did not take part in the RTE data collection but was one of the many informants involved in the study and contributed with user pattern information collected from data loggers installed in 7¹ of the ECOCA's.

The scope of the Real Time Evaluation is impact; coverage & connectedness; effectiveness & coordination; and appropriateness & efficiency of the ECOCA electrical solar cooker. The report presents findings, lessons learned and challenges, including recommendations for mitigation measures to address these challenges. The recommendations are specific actions that can be taken now to improve implementation the remaining six weeks of the pilot and enhance upcoming pilots in other countries and contexts. The recommendations are summarised at the end.

A similar RTE was conducted for the sister-pilot in the Bidibidi Refugee Settlement and adjacent host community in Northern Uganda in April 2019. Findings from this study is described in a separate report.

Methodology

The RTE was conducted in the wake of the pilot of 50 ECOCA's within the two villages Kapaung Pin and Kapen in Myanmar targeting IDPs. In each village 25 ECOCA's were installed, of which one (1) at the time of the RTE was pending due to a technical fault with the battery (replacement done by KMSS on May 15th 2019).

The 50 beneficiaries were selected based on vulnerability criteria (the poorest IDPs) in order to target the most vulnerable households. Priority was given to those contributing actively to the common good of the village and who had also lived in in village for long time (such as representatives in village CBOs.) in order to benefit the whole village indirectly. Based on these criteria, the village administrators, the village elders and the religious leaders in the two villages selected the 50 beneficiaries. Caritas Denmark visited a selection of the beneficiaries before they received their ECOCA to ensure that these lived up to the selection criteria.

The beneficiary selection was done in a way to gather understanding and support for the selection, while at the same time acknowledging that knowledge exists within communities to determine which households are most needy and

¹ Data loggers were installed in 10 ECOCA's, but for two of the loggers some of the collected data bins are corrupted, why these have been disregarded for the RTE, and the battery challenge in the third ECOCA limited the data availability for the RTE report to seven loggers. The data will however be available for the full period from all 10 loggers for the endline report, though the logger from the ECOCA with the battery problem will not have much to tell from the period up til the RTE.

vulnerable. In addition, the method of beneficiary selection was seen as a way to create common consensus and prevent opposition and jealousy from those not being selected to receive an ECOCA during the pilot.

The RTE data collection started with a review of the questionnaire used in the Bidibidi Refugee Settlement with 59 questions. Though adjustments were made based on the learning from Uganda, a number of questions proved irrelevant in the Myanmar context and were changed on site during the interviews, as additional points of importance appeared. Still, the questionnaire formed the basis for a series of semi-structured interviews with the beneficiaries of the ECOCA to assess the following:

- i. impact (cooking, phone charging, light, health, protection)
- ii. Coverage & Connectedness (willingness and ability to pay)
- iii. Effectiveness & Coordination (training)
- iv. Appropriateness & Efficiency (design)

From 30 April – 3 May 2019 the RTE team was in the Kapaung Pin and Kapen village and conducted interviews with fifteen (15) randomly selected beneficiaries using the semi-structured questionnaire and 12 females and 3 males responded to the questionnaire.

More informal interviews were also conducted with key informants such as a teacher in each village who act as project animators, with a village administrator and with key staff. Ad-hoc focus groups sometimes formed allowing for open discussion on a number of relevant issues, in order to triangulate the response from the 15 interviewees and gain a basis for deeper understanding of explanations provided. Especially regarding theme ii, this methodology offered more insight than the semi-structured interviews, as willingness and ability to pay proved difficult for many respondents to assess.

The interviews are in this report additionally validated against the findings of seven (7) data loggers installed in some of the piloted ECOCA, which provide real-time technical data feedback on various parameters, e.g. individual household use of the ECOCA per day.

One validation meeting was held with the two animators before leaving the villages and one in Taungoo between Caritas Denmark and Caritas Myanmar/KMSS upon finalisation of the data collection, both on the afternoon of 3 May 2019. During this meeting, participants were presented with the preliminary overall findings of the RTE and draft recommendations were discussed.

On the first day of data collection, the RTE team was made up of the Caritas Myanmar/KMSS Director Fr. Abel and Caritas Denmark Programme Coordinator Maj Forum. On the subsequent 3 days, Programme Coordinator Waing Thinzar Moe replaced the role of the Caritas Myanmar/KMSS Director. The team was accompanied by a repair team comprising PESITHO Technician Marco Tinggaard and project staff Celestine Myo Myint Aung. Caritas Denmark Programme Coordinator Maj Forum is also responsible for drafting the RTE report to which Caritas Denmark Team Leader Betina Gollander-Jensen and WFP Energy for Food

Security Advisor Raffaella Bellanca will provide comments. PESITHO is given the opportunity to validate the report before it becomes final.

Summary of technical issues during the first six weeks of implementation

The ECOCA had been tested and exposed for various stress factors for months in Denmark before it was piloted in Myanmar. Despite these initial tests, the harsh environment with high temperatures (up to 45 degrees Celsius) and dust/dirt, coupled with the equipment handling of persons largely inexperienced with technologies of any sorts, provided an excellent basis to put the ECOCA to its final tests before consideration putting the product into production.

Below is an overview of the type and frequency of problems experienced in the two villages, either with the cooker, the charger or the light bulbs. During the RTE visit, the PESITHO repair team troubleshooted all 50 ECOCAs and fixed all deficiencies related to cooker and charger. All relays were exchanged with a different type with a stronger capacity to avoid similar defects from reoccurring (red + green light). The broken light bulbs were replaced, but a long-term solution should be identified as they are expected to brake again.

Technical problems experienced with the ECOCA in Myanmar

The error list for in Kapaung Pin (recorded by the PESITHO repair team during the RTE visit April 2019)							
Sr.	Serial No.	Red light	Green Light	USB & Blue Light	Lamps	Connector	Stove & Pot
1	CP-M.009-2018		Error		1 error	Lose	
2	CP-M.029-2018	Error			2 error		
3	CP-M.013-2018			Error	1 error		
4	CP-M.042-2018		Error		2 error		
5	CP-M.023-2018	Error			1 error		
6	CP-M.048-2018	Error	Error	Error			Stove & Pot burned
7	CP-M.008-2018				2 error	Lose	
8	CP-M.044-2018				2 erroe	Lose	
9	CP-M.002-2018	Error		2 USB wires error		Lose	
10	CP-M.007-2018				2 error		
11	CP-M.043-2018				1 error	Lose	
12	CP-M.014-2018			USB & Blue Light error	1 error	Lose	
13	CP-M.032-2018				2 error	Lose	
14	CP-M.006-2018				1 error		
15	CP-M.049-2018			1 USB wire error			
16	CP-M.033.2018	Error			1 error & burned		

17	CP-M.001.2018				2 error	Lose	
18	CP-M.017.2018				1 error	Lose	
19	CP-M.015.2018				1 error		
20	CP-M-031-2018						
21	CP-M-025-2018	Error			1		
22	CP-M-046-2018						
23	CP-M-035-2018				1		
24	CP-M-037-2018	NO battery, installation of new battery 15-05-2018.					
25	CP-M-003-2018						

The error list for Kapen (recorded by the PESITHO repair team during the RTE visit April 2019)						
Sr.	Serial No.	Red light	Green light	Error Lamps	USB &Blue Light	Connector
1	CP-M.047-2018	Error		1		
2	CP-M.018-2018	Error				
3	CP-M.022-2018	Error				
4	CP-M.028-2018	Error				
5	CP-M.038-2018	Error		1		
6	CP-M.050-2018			2		
7	CP-M.041-2018	Error		1		
8	CP-M-030-2018	Error		1		
9	CP-M.010-2018	Error				
10	CP-M.034-2018	Error			Error	
11	CP-M.021-2018	Error				
12	CP-M.020-2018	Error		2		
13	CP-M.019-2018	Error				
14	CP-M.016-2018	Error	Error	1		
15	CP-M.036-2018	Error		1		
16	CP-M.004-2018	Error	Error	1		Lose
17	CP-M.012-2018	Error				Lose
18	CP-M.011-2018	Error	Error	2		
19	CP-M.024-208			2		
20	CP-M-040-2018	error				
21	CP-M-005-2018					
22	CP-M-039-2018				1	
23	CP-M-026-2018	error				
24	CP-M-027-2018	Error	Error			
25	CP-M-045-2018			2		

Findings Related to Impact

Cooking

The technical challenges regarding the red light function had posed a challenge to the cooking of most ECOCA beneficiaries (especially in Kapen village), as this

prevented the pot from achieving the necessary heat level. At the time of the RTE, for many the cooking on the ECOCA had partly been put on hold for several days and even weeks and they were eager to have their ECOCA fixed by the PESITHO repair team. The interviews therefore focussed on the cooking patterns that the individual households had become used to up till the point when they each experienced the red light default.

Fourteen (14/15) respondents, equalling 93%, used the cooking function of the ECOCA everyday, before they experienced the red light default. This tendency was confirmed by the seven data loggers which provided detailed evidence of the households ECOCA usage until the red light defaults (overlap with three of the household interviewed), as illustrated in the annex.

Seven (7/14) respondents cooked all dishes for all meals on the ECOCA, except when frying (for which the ECOCA is not suited) and to the extent possible considering the power shortage that five (5/7) respondents experienced in the mornings. Some had enough power to prepare one or two of the morning meal dishes, while one household had no more power left at this time of the day. Of the seven, one household supplemented the rice cooking by using firewood, as the pot is too small to cook rice for the eight people in this household. Another household instead cooked rice twice on the ECOCA for each meal in order to have enough rice for the entire family. How often the respondents fry food was not systematically addressed, though testimonies provided varied from less than daily to all meals.

The morning power shortage experienced is a testimony to the comprehensive ECOCA usage in these households. The data loggers later revealed that the power availability can be optimised by adjusting the position of the solar panels and more regular dusting.

Three (3/14) respondents cook only rice and water on their ECOCA. In two cases, this was done by the husband, while the wife who was in charge of the remaining dishes refused to try to use the ECOCA. These were the only two households interviewed who use charcoal for cooking. They were elderly people and though the husbands were highly motivated to further reduce on the charcoal usage, they had despite many attempts not managed to convince their wives to give the ECOCA a chance. The third respondent only used her ECOCA for water and rice, as she – being the mother of nine children - was so dependent on it for this usage that she was scared to jinx her luck by over-exploiting the equipment. Her rice cooking was supplemented by using firewood in order to prepare sufficient rice for her entire family.

One (1/14) respondent was ashamed to admit that she had not figured out how to successfully cook rice on the ECOCA and had been too shy to ask for help. She used it for boiling water and for cooking soup and curry, every day, but not for every meal as some meals consisted of rice (that she could not cook) and fried food (which cannot be prepared on the ECOCA).

Finally, three (3/14) respondents use only the ECOCA daily for boiling water, though prepare rice and/or soup 2-3 times per week. Different explanations were provided. A young lady with an infant on her lap explained that their farm is very far and that her husband spends most of his time there. She is therefore alone with the infant and has difficulties finding time to cook every day. For this reason, she gets most of her meals from her mother's house. The soup or rice that she does cook sometimes, are prepared on the ECOCA.

Another young lady, living with her parents, had had difficulties cooking rice on the ECOCA. She experienced that 1/3 of the rice were not suitable for eating. Despite this fact, several times a week when the parents were away on the farm, she cooked rice on the ECOCA for her husband and child, feeding the last third to the pig. She did not use the ECOCA for other dishes, as she would not allow the pots used for water and rice respectively to gain a taste of curry. She said that if she had a third pot, she would use this for cooking curry and other dishes.

The third of the three only using the ECOCA for boiling water on a daily basis, cooks 23 cups of rice (using firewood) every day to feed her family. As the ECOCA with the 4 litres pot can only cook 3,5 cups at the time, this was not an efficient alternative. Additionally, the respondent mentioned that though she had tried to cook rice on the ECOCA twice, she had not succeeded to achieve a good result. The family cannot afford curry, but has a bit of fried vegetables with their rice instead (Using firewood). Twice a week the family eats soup, which she prepares on the ECOCA.

The only respondent who does not use her ECOCA daily was a young lady, who unsuccessfully had used it five times after which she had given up. Two times she had attempted to boil water. The first time, the water had not yet boiled, when the family were to leave for the farm in the morning. The second time, she was in doubt as to whether or not the water had boiled. Three times she had tried to cook rice, but the result was not satisfactory. She explained that she was scared that she might accidentally break the ECOCA and she was concerned in that case if she perhaps would be made to replace it.

For eight respondents the volumes of water boiled on the ECOCA was captured, showing an average of 6 litres boiled for drinking water and tea.

Daily frequency	Volumes for each batch	Total daily quantity	Comments
3	2	6	
2	3	6	
2	2	4	
3	1,5	4,5	
3-4	2	7	
2	4	6	One additional batch boiled by use of firewood, not to "overheat and break the ECOCA"
3	4	12	
1	4	4	

		6	Average
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Nine (9/14) respondents prefer the taste of the food cooked on the ECOCA compared to their traditional cooking. Two (2/14) experienced that the taste was the same, while three (3/14) preferred the food cooked using firewood. Of the latter, one explained that with the ECOCA the rice became too soft to dip in curry and two felt that it tasted less. Other advantage mentioned besides the taste was that the food keeps warm longer in the ECOCA pot and that one can use the time for other things while cooking.

A surprising finding was that four households reported that they eat more rice when cooking on the ECOCA and/or becomes hungry again quicker. This was not systematically addressed and will need research as well as further follow up at the endline data collection.

All respondents using the ECOCA daily (14/14) reported significant reductions in their use of charcoal (2/14) or firewood (12/14). One of the latter explained that the reduction was partly due to the changes in her daily routine caused by the birth of her infant, whereby it was difficult for her to distinguish what change was caused by the ECOCA. Her replies are therefore excluded from this section. The same applies for the respondent who gave up on using her ECOCA. As none of the respondents using firewood, paid for this fuel, these interviews only focussed on the time saved.

While the households of six (6/11) respondents used to collect firewood every day, one (1/11) household collected firewood four times per week and four (4/11) respondents answered that their household collected firewood two to three times per week. After the arrival of the ECOCA, the firewood collection has been reduced to two to three times per week for five (5/11) respondents, once per week for four (4/11) respondents and once every second week for the last two (2/11) respondents. **In average, the number of times that the households on a weekly basis collect firewood has gone from five times to two times.**

The time spent when collecting fire wood has remained at 1-2,5 hours for all households, while the number of household members participating in the fire wood collection has reduced from 20 to 12 people across the 11 households. **The average number of man hours has reduced from 21 hours per week to seven hours; a total average reduction of 14 hours per week with the current level of ECOCA usage, equivalent of 66%.**

There is an enormous span in the time spent on fire wood collection among the households, both before and after the arrival of the ECOCA. From the interviews, several explanatory factors manifested. Clearly, there is a difference in the capability of young adolescent, a weak and elderly woman and a grown healthy man. Secondly, some households had access to bicycles or even motorcycles which reduces the travel time. Finally, the distances between the homes and the sites from where they collected firewood highly differed. One man reported to live just next to his 12 acres farm, which provided him with the possibility to cut

down full trees upon need. Others had to travel long distances by foot in order to collect fire wood on other farms and carry this heavy load back to their homes.

The time saved were used for farming, income generation and for picking vegetables for household consumption (9/11). Four households spent the time on farm labour, which provides them with MMK 4000 for a full day's work. Another means for income generation mentioned was selling bamboo shoots, which would provide MMK 2500 for a day's work. One lady spending her time helping her husband farming on their own land, explained that they are now able to cultivate 2 acres instead of one. Other activities mentioned were household chores (4/11), for caring for children (3/11) and one respondent mentioned that the children now have more time for playing.

Of the fifteen respondents, ten experience conflict and harassment when collecting firewood, while four do not and one does not collect firewood at all due to old age (buys charcoal instead). The ten reported that they either do not have land of their own or they have cultivated the entire plot so that there is no wood left to collect.

This leaves them with the choice of either walk to the forest, which (especially from Kapen village) is too far to reach on a normal day or to collect on the farm of others, which of course is not very popular with the land owners. There is no conflict in the forest, except in the summer time when everyone is collecting for the rainy season and even the forest becomes busy with fire wood collectors.

On the other farms, they are shouted at, and when caught they are escorted out and have to give back what they have collected. A very poor lady with a large family explained that in these situations, in the presence of her children who contributes with the task of collecting firewood, she begs to be allowed to keep the firewood and that sometimes permission is given to her if she promises never to come back.

Another respondent explained that it used to be acceptable to collect firewood on the land of others, but in recent years since people have started collecting firewood for sales in the local market to make an income, this practice is now much less accepted. The four respondents who reported not to experience conflict when collecting firewood, explained either that they collected only on own land or because they make sure to ask first and only collect if acceptance is given in advance.

Several women mentioned the risks of snakes and of rape, though none reported any incidents of either actually happening. There is no doubt that fire wood collecting is physically very hard work, and some respondents reported that they need to rest during as well as after the activity. One lady shared that she has a permanent very sore bump on her head from where she carries the wood.

Health & Protection Issues

Nevertheless, when asked directly if their health conditions have changed after receiving the ECOCA, none of the respondents mentioned change related to less hard work.

Instead, a third of the respondents mentioned either that they are less exposed to smoke or that they have better breathing or cough less. One reported a reduction in headaches and two explained that they experience less health implications due to heat, which one specified as dizziness. Several mentioned (when asked more generally about advantages of the ECOCA) that it is more comfortable to them not being exposed to the heat when cooking (during the RTE it was 42-45 degrees Celsius): *"I don't feel hot anymore"*.

A number of people mentioned that the smell of burning plastic in the villages has reduced. It was explained that most people use plastic to lit their fire, whereby fumes of burned plastic is released from all households in the villages. Before the arrival of the ECOCA, this was every time someone cooked or boiled water. In the mornings when all families apparently cook simultaneously, the villages were reported as being shrouded in the fumes of burned plastic. With about half the villagers having received an ECOCA, the change is noticeable, it was said.

All respondents reported to have installed their solar panels on wooden stands as permanent fixtures. Twelve (12/15) feel that this installation makes it safe to leave the house without risking theft of the solar panel. Several mentioned that *"there is no thief in this village"*. The remaining three were mainly concerned with the access from the road, and one would not leave the house if there was none home to watch the solar panel.

Phone charging

One of the extra features of the ECOCA is that it is fitted with two standard USB charging ports for an AUX power outlet. This means the beneficiaries can charge small outlets like mobile phones and shavers/razors with no extra operational cost, which enables the user to save money for purchasing phone charging. In addition, the USB charging port provides the beneficiary with the opportunity to gain an income by charging the phones or other appliances.

Only six (6) of the fifteen (15) households are in possession of a mobile phone. Of these one (1) household owns two (2) mobile phones. All of these seven (7) mobile phones are being charged on the ECOCA's. Additionally, eight (8) households charge mobile phones for friends and relatives in the villages. All of them however do this for free, and thereby loose out on the opportunity to make an income. Instead, this results in the spill-over effect of other households in the villages accessing free and convenient phone charging.

In both villages, many of the households who did not receive an ECOCA and some of the households who did, already owned a 70 watt solar panel and a 20 watt battery allowing for charging of phone and other appliances such as torch lights and powering of lamps (see more on this in next section). For this reason, a culture already exists in the villages where those who have electricity access are expected to share with those who have not – free of charge. Some of the ECOCA beneficiaries consequently used to access this service free of charge themselves, which makes it difficult for them to request a payment.

Another key explanatory factor is the limited number of households in these villages (50 and 58 respectively), which implies that the inhabitants all know each other and many one way or the other are related. As a young lady stated: *"I do not feel comfortable asking my cousin to pay to charge his phone"*. An advantage to the ECOCA households which was mentioned by a respondent is that they are now the ones to provide a favour rather than asking for one. Being the owner of electricity access is hence (note though that this was only mentioned by one respondent) attractive beyond just being convenient.

One (1/15) respondent charges also a torch light on the ECOCA, which was the only documented case of a respondent charging other appliance than phones and ECOCA light bulbs on the ECOCA. Hence, in contrast to the Ugandan target group, the potential for electricity-based income generation was not yet utilised with this target group.

Light bulb

The ECOCA comes with 2 LED rechargeable portable lamps, making indoor activities like cooking supper at night and homework possible without needing to use conventional fuel sources like torches, kerosene or paraffin lights.

With the Myanmar pilot target group, the most prevalent means of indoor lighting before the ECOCA were candles and solar powered 1,5 feet fluorescent lamps. Six (6) respondents previously used only candle lights, typically 3 large candles per day, at a price of MMK 100 each. Three (3) used only solar powered 1,5 feet fluorescent lamps, while two (2) supplemented these with one (1) or two (2) mini light bulbs resembling the ECOCA lamps in look but not in function (photo is on file), and one (1) had instead a solar powered 3 feet fluorescent lamps. One (1) household had a rechargeable torch light and a solar lamp, while another used only a rechargeable torch light. Finally, one (1) household had an old fashion battery driven torch light, which they supplemented with candles.

After receiving the ECOCA and the supplementary two (2) ECOCA lamps, only three (3) households continued to also use their previous means of indoor lighting. This included the two (2) households with rechargeable torch lights and an elderly couple who had prioritised to keep their solar powered 1,5 feet fluorescent lamps as indoor lighting while using the ECOCA lamps for outdoor terrace lighting allowing for socialising with neighbours.

Except the latter, the owners of the 70 watts solar panels and 20 watts batteries had stop using these after the arrival of the ECOCA, due to their limited capacity and inconvenient plugging/connecting system (photo on file). Original cost of this system was approximately MMK 35.000. One (1) respondent reported to have given her panel and battery to the church, as she would no longer be needing it with the ECOCA as replacement.

At the time of the RTE, the majority of the ECOCA lamp batteries were either not working at all or only at a very limited capacity. This meant for many of the beneficiaries that they would only have 1-2 hours of light from each of the ECOCA lamps after charging and some would only work if kept in the plug, whereby compromising the mobile potential. It was consequently of high

appreciation to the beneficiaries that the PESTHO repair team replaced all dysfunctional ECOCA lamps.

All respondents reported the highest satisfaction with the ECOCA lamps – when these were well-functioning. The majority (8/15) experienced significant savings on candles and batteries, with a weekly average saving of 957 (see table on page 13). The light from the ECOCA lamps were explained to be much brighter and the mobility of the lamps were appreciated.

When asked about the advantages and disadvantages of the ECOCA lamps compared to their previous means of indoor lighting, four (4/15) respondents mentioned that with the ECOCA lamps they can do household chores in the evenings (such as chopping firewood and making pig feed), which meant that they had more available time during the day to do farming or undertake other income generating activities. Among these four (4), one (1/4) explained that additionally their family has started making grass roofing in the evenings, which saves them an annual expenditure of MMK 150.000, equalling an average of MMK 12.500 per month.

Another household (1/15) has initiated a number of evening activities supplementing the family income and food availability, including alcohol production (weekly income of MMK 2.500), snail collection (exchanged for tea leaves in nearby town), and night fishing (provides daily fresh fish supplement to the family food intake). Considering the brief period when the households have had well-functioning ECOCA light bulbs, there is a major potential for this trend to develop with the replacement of the light bulbs.

Other impact from the ECOCA lamps mentioned by the respondents included:

- better reading/studying (mentioned by 7/15, one household has even become study house for neighbouring children),
- can go to the latrines at night,
- having guests, visiting and sitting outside talking to neighbours,
- light for cooking and caring for children when returning from farm after dark,
- children stay up longer to play,
- "House is full of light"

Those who previously depended on candles appreciated to be relieved of the concern related to risk of fire on the wooden houses. Also, it was mentioned that in contrast to candles, the ECOCA lamps do not blow out. No disadvantages were mentioned. The impact on poverty and not least on quality of life resulting from the ECOCA lamps were significant, which makes it crucial to find a modality that allows for a higher durability.

Table of savings and income per week in MMK per ECOCA component

No of respondents	Firewood collection		Lighth bulbs		Total savings/income per respondent
	Savings	Income (from time saved)	Candle/battery Savings	Income (from light in evening)	
1		1.000	2.800		3.800
2	10.000	1.500	1.800		13.300

3		2.000	2.100		4.100
4			2.100		2.100
5			2.000		2.000
6		farming			
7				3.000	3.000
8		6.000			6.000
9	375				375
10		farming			
11		farming			
12		farming	1.650		1.650
13			500		500
14			1.400		1.400
15				2.500	2.500
<i>Total</i>					
Average			957		2.715
Average in approx. USD					1.8

Findings Related to Coverage & Connectedness

Willingness to pay

It was not possible to obtain reliable information on the willingness or ability to pay from the semi-structured beneficiary household interviews, though the savings and additional incomes of course provides a useful indication on ability. Instead a number of ad hoc discussions was engaged in on this topic with various key informants such as the school teachers, village administrator and staff.

It appeared to be the impression of many that the majority of the villagers are too poor to contribute to the costs, though some were of the perception that MMK 10,000-15,000 would be a realistic monthly contribution by many. At the same time, it was mentioned by several that residents of neighbouring villages had asked if they could buy an ECOCA. One person in Kapen explained that this village is particularly poor due to the IDP background of the majority of residents, while other villages in the area might have better purchasing powers.

Looking at the average weekly saving/income from the 15 respondents, the potential for them to purchase an ECOCA appears a bit far fetched. This indicates that the initial starting segment should perhaps be those who do in fact have a great potential for saving or making an income from having an ECOCA. Looking at the 1/3 with the highest saving/income from the ECOCA, the weekly average is 6040, equivalent of 4 dollars. This could indicate a monthly investment potential of 16 dollars, which is 190 dollars in one year.

Making the same calculation with the average of the 15 result in 86 dollars on one year, which may be insufficient. However, with a timespan of 18-24 months it could still be relevant. Ability does however not ensure willingness. Also, it should be kept in mind that the savings/income related to the light bulbs could also be achieved with a much less expensive solution such as a high-quality solar lamp.

Findings Related to Effectiveness & Coordination

Training

Eleven respondents (11/14²) reported that they had received sufficient training and that any limitations to their ECOCA usage could not be mitigated by more training. Three (3) respondents had not yet learned how to cook rice, which clearly calls for additional training efforts.

In Kapaung Pin village, the animator explained that only 3 of 25 households still have challenges cooking and she is working on getting these last challenging users on board.

In Kapen village, a prevalent problem with rice cooking was reported by the animator. This was due to the fact that these villagers cook a different and harder type of rice compared to the residents in the other village. The animator had not found a solution to this challenge on her own. She was advised to soak the rice before boiling, which was successfully tested during the RTE visit. A rather comprehensive follow-up work is subsequently necessary to assist the remaining villagers who have been discouraged by their many unsuccessful attempts to take up this new rice cooking method.

Findings Related to Appropriateness & Efficiency

Design

All respondents were asked if they had any suggestions for improvements to the ECOCA. Eleven answered (11/15) that it should come with a frying pan. *"If we had a frying pan, we would not have to collect firewood anyone"*, one respondent said. Other additions suggested included a kettle, four pots, more bulbs (respondent offered to pay for these), and the ability to watch television using the ECOCA. Six (6/15) respondents answered when asked for improvements that the pot(s) should be larger.

Thirteen respondents were asked directly how they liked the size and number of pots. Nine (9/13) would prefer a larger pot for rice and/or water, while four felt that the size is appropriate. Five (5/13) respondents would like to have more pots (four answered three pots, while one felt that four would be necessary), and eight respondents were of the opinion that they could manage with two pots. The general argument for more pots were to avoid that the water and especially the rice would have a taste of the other food prepared.

**Mother of nine:
"I could rest a
bit, if I could
cook all the rice
on the ECOCA"**

The reason for the different opinions on the size of the pots can of course partly be found in the number of people being cooked for in the individual households, which was distributed as follows:

² Only 14 were asked, because the animator were present when addressing this topic with the 15th household.

	2 pers.	3 pers.	4 pers.	5 pers.	6 pers.	7 pers.	8 pers.	11 pers.
No. respondents	II	II	II	I	III	I	III	I

The causality however appeared to be a bit more complex. The households of eight and of eleven eating members and one of the households of six eating members did indeed emphasize the need for a larger pot. Nevertheless, the other two households of six eating members and the one of seven eating members found the size of the 4 litres pot to be sufficient. One household did not use it for rice cooking and another divides the cooking so that the grandmother and sister not living in the house but cooking on the ECOCA, cook their food separately from the remaining family. Similarly, one of the households with only 3 eating members felt that the pot was too small, as they often have visitors joining them for meals.

While it clearly differs how much rice one person eats per meal, it seems that the general understanding was that the 3,5 cups of rice that could be cooked in the 4 litres pot would be sufficient for approximately three to four people.

The user manual was generally appreciated (12/15), though three (3/12) did not manage satisfactory rice cooking by usage of the manual. It was suggested that the manual should advice on the cooking of different types of rice. Several explained how they had had to ask children or other relatives to read aloud but that they had managed and that the instructions provided were clear. Two respondents did not receive it and one respondent found it too complicated.

Recommendations

The RTE findings suggest that there are findings at **technical, design or programmatic levels** and therefore the below recommendations are organised into these levels. Some of the findings should be addressed *immediately* during the remaining weeks of the pilot of the ECOCA in order to adjust the outcome and success of the *Endline evaluation* of the pilot. Other findings should be *brought forward to the next version* of the ECOCA and its promotion among vulnerable users such as refugees and their host communities.

Technical recommendations: challenges & mitigations

The challenges with the red/green light (28/50) and well as with the connector (9/50) were identified already during the RTE in Uganda. This provided PESITHO with the opportunity to develop technical improvements that were installed in all 50 ECOCA in Myanmar during the RTE visit there.

Summary of (unresolved) technical challenges & mitigations:

- 1. Light bulb defects** (43/100) were most likely all caused by the rough use, often placed on the bare soil, handled hard, and over-charged.

→ Recommendation: In future productions, replace the present bulb with a better-quality bulb. Alternatively, a power stabilizer can be built into the ECOCA.

→ Recommendation: Bring an assortment for a focus group discussion at the endline to have beneficiaries' preferences taken into consideration in the selection of a replacement bulb for the ECOCA, if this is the chosen path forward.

2. Phone charger defects (6/50) were caused by the USB charging port getting loose with wear.

→ Recommendation: Extra emphasis to securely fix the USB port in future production.

3. Stove and pot burned (1/50) as a child had turned on the stove with the empty pot attached without anyone noticing it.

→ Recommendation: The next version ECOCA should have microprocessor-controlled temperature setting to prevent the pot from reaching critical temperature.

4. Dysfunctioning batteries were detected during installation by PESITHO. These were replaced on site, except one that was missing which was ordered from the producer and left for the local project staff to install (after thorough instructions and with PESITHO on video conference).

→ Recommendation: While PESITHO has already followed up on the dysfunctionality with the dealer, who promises better quality control onwards, it should be considered to have a local supply of spare parts available.

Design recommendations: challenges & mitigations

The RTE findings in relation to the design of the ECOCA and its installation in the pilot, can be divided into two categories, namely design findings related to *behaviour* of the beneficiaries and findings related to chosen *physical set-up* of the ECOCA.

Summary of design challenges & mitigations:

5. Light bulbs defects (see above #1).

→ Recommendation: Depending on the solution found concerning the light bulbs, it is also a possibility to include in the user manual and training package clearer instructions on how long the bulbs should be charged, how they should and should not be treated etc.

→ Recommendation: At the same time, consider for at least one of the bulbs, to promote permanent fixture, e.g. in kitchen area, to prevent the bulb from being damaged by dust and laying on the ground.

6. A harder rice sort is commonly eaten in Kapen village, where the understating of how these can be successfully prepared was not prevalent.

→ Recommendation: The section on rice cooking should be elaborated on in the user manual, which the users actually appear to be using. This should include advice on boiling of harder rice sorts.

7. For many the 4 litres pot are too small, especially for rice cooking, depending on the number of people having their meals in the households. To enable PESITHO's sale of ECOCA's at reasonable costs it is necessary to decide on only on pot size to fit all.

→ Recommendation: The endline studies should have a strong focus on deciding the size of the pots for version 2.

8. A frying pan is in high demand in Myanmar. While most respondents mentioned the need for a frying pan, it was not systematically documented how often the households fry, which is a key information to capture in order to consider this feature in a longer perspective for the Asian market.

→ Recommendation: Systematically document during the endline how often the households fry.

9. The indication that beneficiaries might eat larger quantities of rice when cooked by the ECOCA was a surprising finding. The perception appeared to be that the rice cooked by the ECOCA is softer, better tasting and easier to digest, which makes people eat more and/or becoming hungry again faster.

→ Recommendation: This should be looked further into during the endline and through consultation with nutrition specialists.

10. Solar panels were all installed on wooden stands, though might need adjustment and cleaning. Many households experienced that there was not enough battery left for the breakfast meal, though the immediate findings from the logger data revealed that this could be partly mitigated by a slight adjustment of the solar panel installation direction and by more regular dusting of the panel.

→ Recommendation: PESITHO should scrutinize the logger data further to ensure that the capacity of the solar panel and especially the battery is indeed sufficient to cover the household needs before the version 2 ECOCA is considered final.

→ Recommendation: Guidance on solar panel installation and cleaning should be improved in the user manual.

Programmatic recommendations: challenges & mitigation

Some of the findings in the RTE clearly relate to the way the programme for the pilot was set-up. These findings form excellent platforms to draw lessons learned for the future programmatic design to ensure understanding and proper use, which obviously have significant impact on the success of the product.

Summary of programmatic challenges & mitigations:

11. Light bulbs defects (see above #1).

→ Recommendation: At the same time, a supply of extra bulbs should be put in storage with the partner for the use of the technical support team to change defect bulbs.

12. Solar panels were all installed on wooden stands, though might need adjustment and cleaning (see above #10).

→ Recommendation: 50 beneficiary households to be further instructed on solar panel installation direction and importance of dusting.

13. A harder rice sort is commonly eaten in Kapen village (see above #6).

→ Recommendation: Further training and follow ups are necessary promoting this particular rice boiling method, including 30 minutes of soaking. However, in Kapen village, the teacher clearly expressed that she is overwhelmed with her task as animator. It is therefore important for the project staff to concentrate most of their efforts on assisting her, except for the one week when the teacher in Kapaung Pin village is away on a training course and cannot perform her role.

14. Minor technical challenges can occur (a rat biting holes in the connector cable etc.) and PESITHO cannot travel to Myanmar to follow up on each individual case.

→ Recommendation: It should be possible to train some suitable individuals on site to handle such challenges. It is recommended to identify an individual in each village as well as an electrician in Taungoo, all of which should be trained by PESITHO. The electrician from Taungoo could be called upon in cases when the villagers themselves cannot sort out the matter.

→ Recommendation: In each village a toolbox should be available with the individual trained to undertake repairs. PESITHO's repair team left a toolbox with the local partner as a recommendation for what such should include.

15. Poor concept of savings and investments were prevalent among the beneficiaries in the Myanmar pilot as well as it was in Uganda. The

respondents could explain how much they were saving from using the ECOCA (mostly on candles) and for some also how much more they were earning. Nevertheless, they were not able to conclude on a monetary value of the ECOCA based on these talks, nor did they have any suggestions to appliances that could be invested in for them to earn an additional income from having access to electricity.

→ Recommendation: Integrate a household economy component into the programme set-up of the next pilot to teach investment/business planning to part of the beneficiaries and learn the extent to which this makes difference.

→ Recommendation: Bring possible electrical appliances for a focus group discussion during the endline visit in order to learn if there are any relevant means of making an electricity-based income for this specific target group who refuse to charge money for charging phones. This learning is important for the income potential of the ECOCA and thereby the extent to which it is a possible investment for the target group to make.

→ Recommendation: Keep a project staff on site to monitor the pilot after the ended pilot to learn if additional IGAs come on board later when the beneficiaries have become more familiar with their ECOCA. This would also have the potential of adding small adjustments to be tested along the way, such as providing a few families with relevant electrical appliances with IGA potential.

16. Cooking is a challenge for few. Therefore, it should be possible to follow up with these and learn if it is in fact possible to change the behaviour and routine of also the slowest movers.

→ Recommendation: In Kapen village, the teacher clearly expressed that she is overwhelmed with her task as animator. It is therefore important for the project staff to concentrate most of their efforts on assisting her, except for the one week when the teacher in Kapaung Pin village is away on a training course and cannot perform her role.

Conclusion

Despite the vulnerability of this selected target group and the technical difficulties experienced, it appears that the villagers of Kapen and Kapaung Pin only six weeks into the pilot have managed to adopt the ECOCA in their cooking routines. 93% of the 15 respondents reported to be using the cooking function of the ECOCA on an everyday basis. This tendency was confirmed by the seven data loggers, showing that all seven have been using their ECOCA almost every day, with some using it for up to 4 meals/times per day³ (see the following pages).

The constraints in usage identified were limited to a) problems with cooking certain types of rice, b) insufficient charging of the battery for the morning meal, c) too small a pot to fit the rice cooking needs of large households, d) the

³ One meal/time is defined by a break of at least two hours since it was used last.

inability to fry, e) fear of breaking the equipment though over-exploitation, and f) reluctance to adopt new technology.

Item a, b and e can be mitigated through further training, and is expected to have reduced drastically at the time of the endline. The fact that half of the respondents using the ECOCA (7/14) already is using it as much as absolutely possible (for everything that it can be used for, until there is no more battery), indicates a great potential for the endline results if the remaining half receives the needed training between now and then, as recommended. In the future, this extensive need for training and follow up should be incorporated in the programmatic set-up supporting the product distribution. Partly this could be obtained by improvement of the user manual.

Item c is a key learning that can easily be remedied in future production, while item d calls for further product development, which may not be a cost-efficient investment at this early stage. Item f can possibly be partly mitigated by further training and by time and exposure, but it should also be recognized that some individuals might be too old or too vulnerable to have real potential for behavioural change.

All 14 respondents (14/15) using the ECOCA daily reported significant reductions in their use of charcoal (2/14) or firewood (12/14). The average number of times that the households on a weekly basis collect firewood has gone from five times to two times, and the average number of man hours has reduced from 21 hours per week to seven hours. This translates into a 66% reduction in the time spent collecting firewood, based on the current level of ECOCA usage.

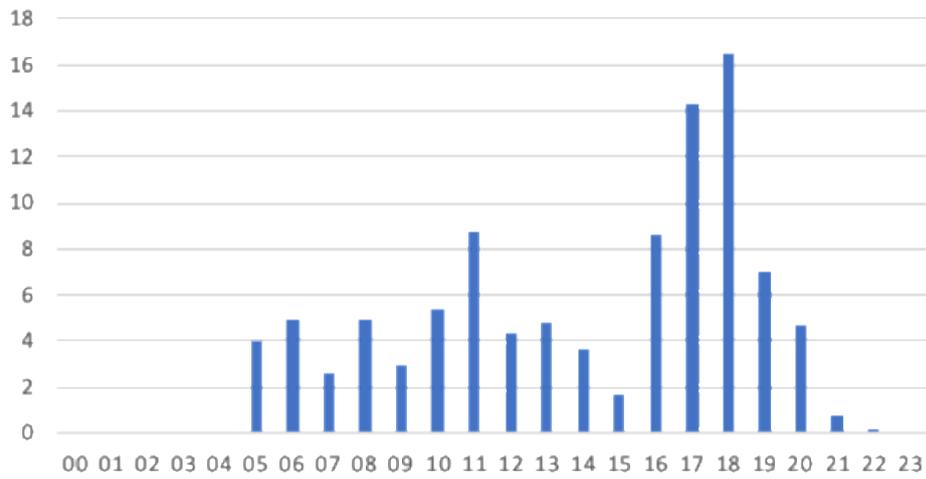
It was established that 82% spent time saved on fire wood collection on farming, income generation and picking vegetables for household consumption instead. This is likely to have rather significant impact on these very poor households, which might become more evident over time.

Also, the impact potential on poverty and not least on quality of life resulting from the ECOCA lamps were reported to be significant, which makes it crucial to find a modality that allows for a higher durability of the light bulbs as an ECOCA accessory. Money were saved on candles and batteries, and in short time, some families had ventured into new evening IGAs and several reported similarly to spent evenings on household chores, allowing for more IGA engagement during the day.

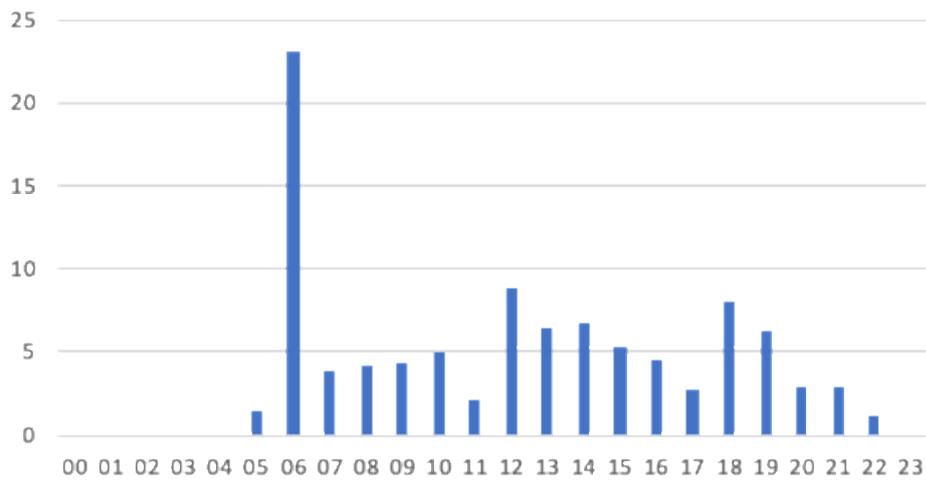
Therefore, while the target group in Myanmar seemingly are not utilizing the potential for electricity-based income generation - as was the case with the Ugandan target group - the findings still made a convincing case for the ECOCA as an enabler of poverty reduction and food security improvements. To conclude on the impact though, it will be key to follow the target group and their ECOCA usage for a longer period of time.

Annex – Data extracts from the seven loggers

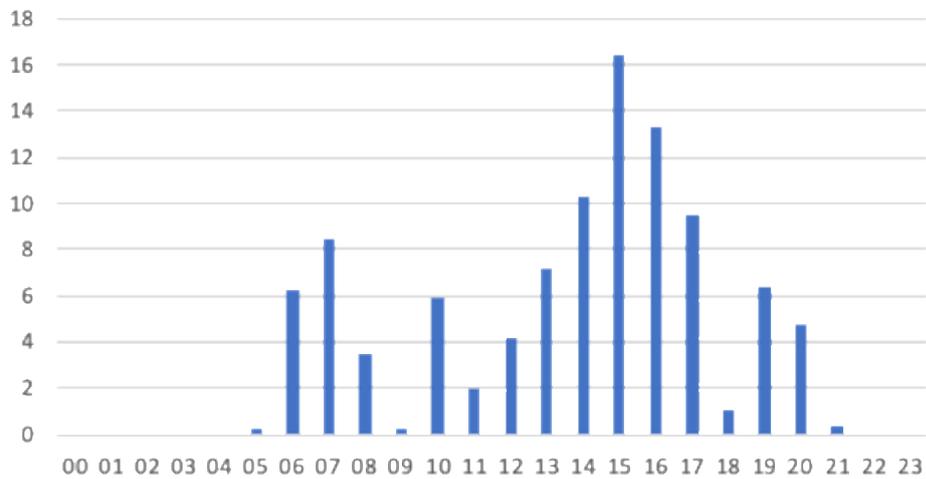
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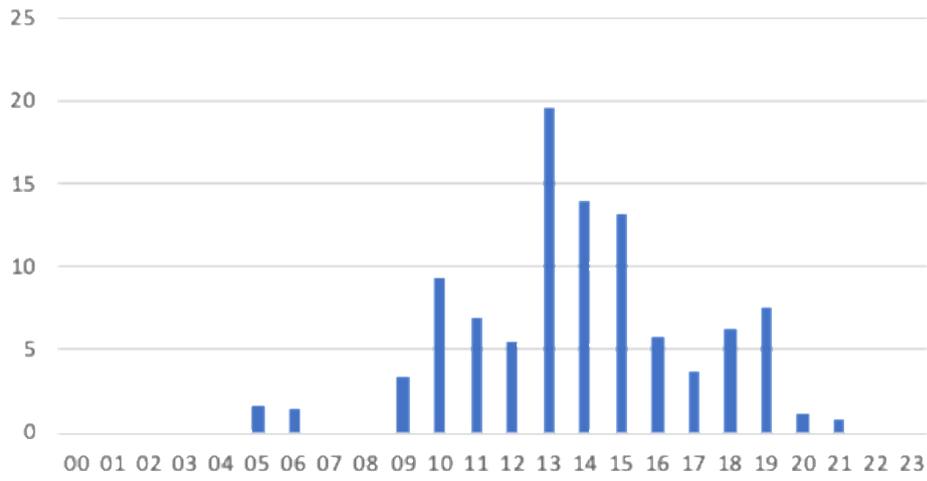
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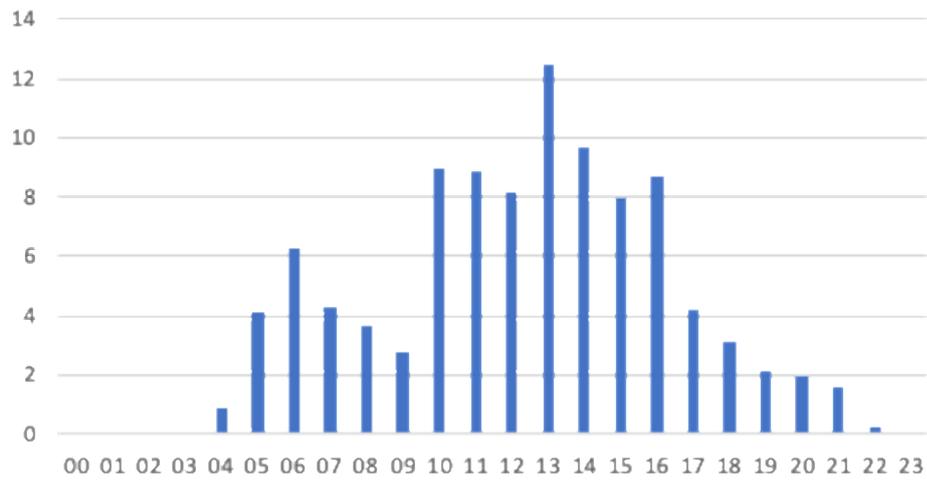
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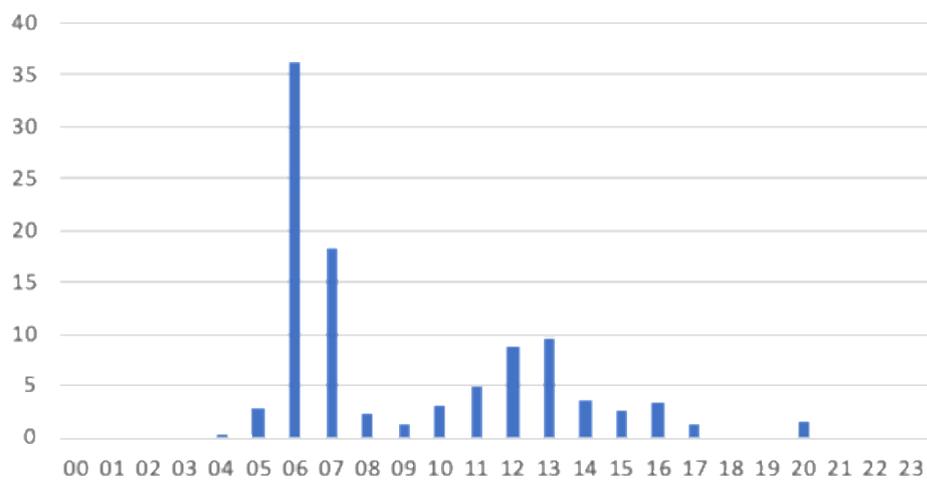
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CP-M044-2018



CP-M047-2018



CP-M-049-2018

