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# Malawi Renewable Energy Acceleration Programme (MREAP)

MREAP is led by the University of Strathclyde and funded by the Scottish Government. It has operated over 2012 - 2015.



# Process Evaluation of Community Energy Development Programme Projects

## Dedicated Study

**MREAP Strand:** Institutional Support Programme (ISP)

**Produced By:** Catherine Currie, Gill Davies, Enrique W. Young, IOD PARC

**Received:** April 2015

**Abstract:** This report sets out the findings, conclusions and recommendations of a Process Evaluation, conducted between January and March 2015, of the Community Energy Development Programme (CEDP) projects as part of the Malawi Renewable Energy Acceleration Programme (MREAP). It was commissioned by the Scottish Government (SG) as a product of the Institutional Support Programme Component (ISP) of MREAP. Its main purpose is to assess what has been delivered, how this has been achieved and to compile learning from the process for policy and future projects.

The agreed scope for the process evaluation was the portfolio of 46 CEDP projects implemented across the 3 regions of Malawi and the relevant processes and systems in place to design, implement and manage these projects. Due consideration was also given to framing the scope of the evaluation through the choice of evaluation questions and the feasibility of what was possible.

MREAP is led by the University of Strathclyde and funded by the Scottish Government  
For more information visit: <http://www.strath.ac.uk/eee/energymalawi/>  
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# Process Evaluation of Community Energy Development Programme Projects

Malawi Renewable Energy Acceleration Programme

Final – April 2015

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Prepared for // University of Strathclyde

Date // April 2015

By// Catherine Currie with research support from Gill Davies and Enrique W. Young

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The Process Evaluation was written by IOD PARC and reflects the opinions of the author only.

## *Dedication*

In memory of Alexander G. Banda who was a valued and respected member of the MREAP team.

# Acronyms

CBO	Community Based Organisation
CEDP	Community Energy Development Programme
CEM	Community Energy Malawi
CES	Community Energy Scotland
DC	District Commissioner
DEC	Development Executive Committee
DEM	District Education Manager
DEP	District Education Plan
DO	Development Officer
EMC	Energy Management Committee
GOM	Government of Malawi
HH	Household
ISP	Institutional Support Programme
M&E	Monitoring and Evaluation
M&L Framework	Monitoring and Learning Framework
MREAP	Malawi Renewable Energy Acceleration Programme
MuREA	Mulanje Renewable Energy Association
NESP	National Education Sector Plan
OECD	Organisation for Economic Cooperation & Development
O&M	Operations and Maintenance
PEA	Primary Education Adviser
PSG	Programme Steering Group
PV	Photo Voltaic
RE	Renewable Energy
RET	Renewable Energy Technology
SG	Scottish Government
T&S	Travel and Subsistence
WASH	Water, Sanitation and Hygiene

# Executive Summary

## Background

This report sets out the findings, conclusions and recommendations of a Process Evaluation, conducted between January and March 2015, of the Community Energy Development Programme (CEDP) projects as part of the Malawi Renewable Energy Acceleration Programme (MREAP). It was commissioned by the Scottish Government (SG) as a product of the Institutional Support Programme Component (ISP) of MREAP. Its main purpose is to assess what has been delivered, how this has been achieved and to compile learning from the process for policy and future projects.

The agreed scope for the process evaluation was the portfolio of 46 CEDP projects implemented across the 3 regions of Malawi and the relevant processes and systems in place to design, implement and manage these projects. Due consideration was also given to framing the scope of the evaluation through the choice of evaluation questions and the feasibility of what was possible.

The primary audiences of this process evaluation are the SG, the Energy Department of the Government of Malawi, the MREAP partners of CES, University of Strathclyde, Sgurr Energy, the Strategic Energy Partners in Malawi [Polytechnic of Blantyre, Mzuzu University, Mulanje Renewable Energy Association (MuREA), Renewable Energy Malawi or RENAMA and Concern Universal] as well as the newly established Community Energy Malawi (CEM).

## *Limitations and Bias*

It is important to note that the evaluation team is not an impartial outsider. It is an 'insider' to MREAP and as such comes with its own set of bias and preconceptions that it may be unaware of. To limit the impact of this during the process evaluation, the ToR did not include questions on: management and partnership arrangements, an evaluation of ISP activities in relation to CEDP, an analysis of the appropriateness of the Monitoring and Learning framework or an analysis of CEDP reports (financial and narrative) to Strathclyde University.

In a short programme like MREAP (3 years long), the time dedicated to community facilitation means that there is limited ability to provide data through monitoring and reporting on the subsequent livelihood and/or welfare gains. In addition, the relative formality of developing an Monitoring and Evaluation (M&E) system that would enable 'proof of concept' as well as enumerate scope and scale of benefits for a range of different individuals and households is a challenge in this context. CES and the Development Officers were focused on the difficult technical challenges as well as the community facilitation such that the additional requirements for M&E were, as often happens, seen as secondary in nature. A fuller account of limitations and bias can be read in the methodology section.

## *Evaluation Criteria*

The evaluation team focused on OECD DAC criteria of relevance, effectiveness, efficiency, sustainability and substituted impact with results (6 months since installation). Given the interest in learning from MREAP, a short section on innovation and replication was also included.

## Conclusions

Summary conclusions are now presented by evaluation criteria.

## *Relevance*

At 6 months an analysis of evidence suggests the CEDP projects have contributed to an improvement in quality and relevance of education and that over time this could lead to improvement in zonal level results. An analysis of District Education Plans (DEPs) provided evidence that CEDP projects are targeting the most vulnerable and underperforming schools.



However, it appears that the process of engaging with District level officials in relevant sectors (health, education, social welfare) has been unsystematic. Where Primary Education Advisers (PEA) have been engaged there has been a modest amount of influence on them, which in turn has supported an increased awareness of the benefits of energy.

The lighting that CEDP solar PV installations have provided at schools has contributed to improvements in teacher wellbeing, as set out in the Teacher Retention Survey and Impact Report. Teachers consistently reported being happier to stay at the school they were deployed to because of the lighting and improved communications (charging of mobile phones locally).

The capacity building approach of CEDP focused on building the business skills of the Community Based Organisation (CBO). It was ambitious given the low capacity of the CBOs and the high levels of illiteracy. The CBOs did however play a legitimate and consistent role in building a strong sense of community ownership across the projects visited. Arguably however a less diverse portfolio would have freed up more time for increased community support and training.

### *Efficiency*

At the project level an analysis of lifecycle cost modelling suggested that 1 in 3 projects would meet its 9 month target for income generation. Concerns remain over gaps in evidence found in the business plans and through the 3 Es Value for Money assessment. It therefore seems a fair assessment to state that each project requires ongoing financial stewardship and accountability to increase efficiency.

The operational set-up and management of CEDP has changed over the course of 3 years. The push for the creation of CEM was to ensure better efficiency, sustainability and value for money of CEDP. So, the delayed registration of CEM did result in inefficiencies. Unfortunately, the current structure of the financial data does not allow for more detailed analysis at this time.

### *Sustainability*

Key factors demonstrating programme sustainability across the CEDP portfolio and approach are: strong quality control through MERA accredited contractors and inspectors; clear roles and responsibilities between CBO and Energy Management Committee (EMC); strong emphasis from the start on building and sustaining community ownership; conducting business planning and starting small social enterprises (solar lantern sales and/or cookstove production) to generate income for O&M of main system; and crucially that all social enterprises are generating income at 6 months.

The analysis of system sustainability during the evaluation found that 93% of the total number of systems reviewed are functional. Questions remain however over the readiness of the local markets for the systems but at the household level people are already benefiting from increased lighting and improved energy efficiency.

- The cookstove producer groups' sustainability will depend on increasing adoption rates and rolling out appropriate marketing.
- Currently there are problems because some of the community members are failing to pay off their outstanding balances for the lanterns. Adopting a commercial model for CBOs takes time for people to accept, many people thought the lanterns were a donation. It also appears that management of the solar lanterns (i.e. social enterprise) may be best done by a local entrepreneur in the community.

However, it is the overwhelming vulnerability of CEM, with no core funding at present to take it past March 2015, which undermines all the gains in capital (as per sustainable livelihoods model). If core funding is not found then the analysis of lifecycle costs suggests that 2 out of 3 projects could fail before 3 years, all factors remaining equal.

### *Effectiveness*

The diversity of the portfolio makes it difficult to judge effectiveness. MREAP was an action research grant that assumed a low level of local knowledge around modern energy services and their appropriateness to local community needs. To counteract this, CEDP spent 2 years dedicated to building community capacity and

ownership. The key finding from a review of documentation, key informant interviews and focus groups discussions is however that there were three major risks associated with CES' approach that had to be mitigated. Firstly, CES' inexperience in planning and managing in a development context arguably led to too many sites being chosen without any<sup>1</sup> planning and/or management of the amount of total effort that would be required to work over the large geographical area for the budget and time available. The result for CES was much higher support costs than anticipated. These unanticipated costs were borne by CES solely.

The second risk was at the project level. Arguably, a lack of planning and management could contribute to a reduction in the sustainability of project outputs and achievement of project outcomes. More time will need to pass before it is clear whether or not this is the case. However, it is the case that Development Officers were not able to spend as much time as required with communities because they were travelling so often between sites.

The final risk was internally to MREAP from CEDP that the DOs and CES would not have the necessary time to dedicate to monitoring and supporting the roll out of tools associated with collecting and storing data. This was also the case and resulted in additional time being spent by IOD PARC and Strathclyde University to ensure data was collected and stored.

In addition, at 6 months it is arguably too early to assess which interventions are most effective and whether CEDP projects and the CEDP approach are contributing to development outcomes. However, an analysis of different types of capital (as expressed by the Sustainable Livelihoods Framework in terms of human, natural, financial, social and physical) points to comprehensive changes in human and social capital. CEDP projects have contributed to building human capital improvements in terms of health, education, knowledge and skills. Solar PV installations in educational institutions and solar water pumps have produced the greatest increase in social capital through improvements in trust, decision making and leadership. Solar PV installations and solar lanterns also increased the network and connection assets through mobile phone charging facilities. Cookstove projects singularly contributed to the increase in natural assets of forestry and both solar lanterns and cookstoves provided immediate benefits to levels of financial capital in terms of savings and access to credit.

## *Results*

The CEPD portfolio is made up of 46 projects across 12 CBOs located in 12 districts across all regions of Malawi. The total number of beneficiaries of CEDP projects is 20,439. A total of 378 healthy babies were born at the single health clinic monitored by CEDP. CEDP has modestly supported the country's push for improved cookstoves nationwide by setting up producer groups and selling 325 cookstoves in the first 6 months. A total of 9 solar lantern social enterprises were set up by CBOs and sold 465 solar lanterns. All CBOs had generated income by 6 months and patterns in energy expenditure validated users paying for electricity and generating savings from solar lantern adoption. For educational attainment, the overall trend is that exam performance is very gradually improving in CEDP-targeted schools and that lighting does make a difference to a teacher's job satisfaction.

## *Innovation and replicability*

Two key innovative features of CEDP were: i) CBOs managing social enterprises; and, ii) the model of community engagement which has a high degree of community agency and subsidiarity.

At this early stage (6 months post commissioning of systems) it is possible to say that there is increased awareness of the benefits of RE at the community level and using the CBO model to community engagement does appear to provide improvements in social capital at the community level.

## **Recommendations**

The following recommendations are set out to specific stakeholders of the Renewable Energy sector in Malawi and are divided into two time periods: coming year (April to end December 2015) and 2016 onwards.

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<sup>1</sup> Development Officers planned their work and submitted these workplans to CES. However, no documented evidence was found during the process evaluation for the total national plan being reconciled against actual budget/time available.

In the coming year, the following recommendations are made to **Community Energy Malawi**:

1. Rationalise the project portfolio to a manageable geography and size given restricted funds. Conduct a full handover to District of projects that are not included in new portfolio. Officially handover the cookstove projects to the National Taskforce on Cookstoves.
2. Work with the Primary Education Advisers and District Education Managers to monitor and report on change against the Monitoring & Learning Framework at one year from installation for all Community Energy Development Programme projects. Actively include District Executive Committee in the follow up with projects. Invite them to go on monitoring visits, explore ways of including Education Officers on trips to field.
3. Update the training needs assessments of the communities (Community Based Organisation and Energy Management Committee). Where are they now? What do they need? Place a strong emphasis on financial management and develop lifecycle costing models for all projects.
4. Train community members in technical repairs. Simple short term steps can be taken to train community members on how to use basic equipment like a voltmeter or ammeter so that they can test batteries before buying them. The lack of basic technical skills is a common gap in technology transfer projects that ultimately, if not dealt with, leads to a high level of system failure in the short term.

In the coming year, the following recommendations are made to the **Government of Malawi's Department of Energy**:

1. Support Community Energy Malawi to secure core funding so that the investment made by the Scottish Government is sustained. Use Community Energy Malawi as the voice of the community and the glue between the community and the district to learn about how off-grid community managed Renewable Energy projects can be included to increase the proportion of rural households with access to modern energy services. A first step would be asking Community Energy Malawi to manage the community consultation process for the new Energy Plan.
2. Fast-track the appointment of District Energy Officers to monitor and support the new Energy Plan and national policy directives.
3. Consider setting up a National Solar Lantern project that piggy backs on National Cookstove Programme structure. Research the benefits of 'clustering' the two technologies together.
4. Learn from the Development Officers use of MERA accredited contractors and set a national standard for all Renewable Energy Technology installations to use an accredited list and then use MERA has a means of inspection post-installation.
5. Ask MERA to report on number and quality of systems inspected. Begin to develop national level standards for Renewable Energy Technology components.

In the coming year, the following recommendations are made to the **Scottish Government**:

1. Draw out the lessons from this process evaluation and consider how they can be applied to the current portfolio of projects in Malawi;
2. Identify resources and develop a strategy/plan for the dissemination of key learning outputs from MREAP (e.g. process evaluation, Solar PV Sustainability Study, Energy Enables Review Paper). Be proactive in the dissemination of this process evaluation.
3. Actively and transparently communicate the findings of this evaluation to donors (e.g. EU, UNDP and UK Aid) who have previously expressed an interest in learning from MREAP.
4. Then build on the momentum of dissemination 'for learning' and position SG as a donor who does learn from its portfolio. Communicate with grantees (existing and future) how you have fed back in the learning from MREAP into your grant funding cycle.

In the coming year, the following recommendation is made to **Malawi's donor partners** (UK AID, UNDP, World Bank, JICA) and other **external donors interested in the Renewable Energy sector in Malawi**:

1. Consider core funding Community Energy Malawi to provide a platform that can sustain the CEDP project portfolio and through which the community can voice their needs with regards to access to modern energy services and energy efficiency (cooking).

In the coming year, the following recommendations are made to **research institutions and/or INGOs in the energy sector** in Malawi:

1. Provide finance to go back and monitor Primary School Leaving Certificate results in schools with solar pv systems to generate evidence of whether there is an impact on results and the factors that contribute to this (improved quality and relevance of education through improved teacher retention, improved classroom facilities etc)
2. Generate more data on teacher retention and provide a richer picture of the nature of teaching in rural Malawi. What are the factors that are critical to retaining staff and meeting DEPs? Consider repeating the Teacher Retention Survey in October 2015.

From 2016 onwards, the following recommendation is made **to the Scottish Government**:

1. Commission an independent evaluation of MREAP.

# Introduction

## Background

### *Purpose, scope and audience*

This report sets out the findings, conclusions and recommendations of a Process Evaluation conducted between January and March 2015 of the Community Energy Development Programme (CEDP) projects across Malawi as part of the Malawi Renewable Energy Acceleration Programme (MREAP). It was commissioned by the Scottish Government (SG) as a product of the Institutional Support Programme Component (ISP) of MREAP. Its main purpose is to assess what has been delivered, how this has been achieved and to compile learning from the process for policy and future projects.

The objectives of the MREAP process evaluation are to:

1. Identify what funding was spent on? What were short and longer term outputs by policy/activity, and identify any initial outcomes as appropriate.
2. Identify common factors that appear to have supported or hindered success and draw out commonalities across projects or community types?
3. Explore the role played by community engagement in the projects.
4. Investigate how prepared communities are for ongoing O&M as a result of community facilitation role played by DOs of CEM.
5. Make recommendations for future studies on projects.

The agreed scope for the process evaluation was the portfolio of 46 CEDP projects implemented across the 3 regions of Malawi and the relevant processes and systems in place to design, implement and manage these projects. The evaluation team used the 6 monthly regional monitoring reports, the data from the Monitoring and Learning (M&L) Framework and conducted a field trip to evaluate a sample of CEDP projects. In addition, it was necessary to review in details all project documentation kept on the CEDP dropbox. Additional requests for documentation and evidence were made as necessary.

The process evaluation methodology, set out in detail in the methodology section, was to assess the projects against the five standard criteria for evaluating development assistance: relevance, effectiveness (including evidence of change), efficiency, sustainability and innovation/replication. In addition, the evaluator included a value for money analysis within the efficiency section.

The primary audience of this process evaluation is the SG, the Energy Department of the Government of Malawi, the MREAP partners of CES, University of Strathclyde, Sgurr Energy, the Strategic Energy Partners in Malawi [Polytechnic of Blantyre, Mzuzu University, Mulanje Renewable Energy Association (MuREA), Renewable Energy Malawi or RENAMA and Concern Universal] as well as the newly established Community Energy Malawi (CEM).

### *Limitations and Bias*

It is important to note that the evaluation team is not an impartial outsider. It is an 'insider' to MREAP and as such comes with its own set of bias and preconceptions that it may be unaware of. To limit the impact of this during the process evaluation, the ToR did not include questions on: management and partnership arrangements, an evaluation of ISP activities in relation to CEDP, an

analysis of the appropriateness of the M&L framework or an analysis of CEDP reports (financial and narrative) to Strathclyde University.

In addition, the relative formality of developing an M&E system that would enable ‘proof of concept’ as well as enumerate scope and scale of benefits for a range of different individuals and households is a challenge in this context. CES and the DOs were focused on the difficult technical challenges as well as the community facilitation such that the additional requirements for M&E were, as often happens, seen as secondary in nature. A fuller account of limitations and bias can be read in the methodology section.

## Overview of MREAP

In May 2011, the SG funded the ‘University of Strathclyde - Supporting Community Energy Development in Malawi’<sup>1</sup> hereinafter referred to as the Scoping Study. The Scoping Study further developed a picture of community renewable energy projects following the Community Rural Electrification and Development Project (CRED) implemented by the University of Strathclyde, also funded by the SG.<sup>2</sup> A number of stakeholders from the Malawian energy sector identified significant gaps in knowledge around off-grid energy management in the country. In particular, it was noted that there were a reasonable amount and variety of small-scale interventions being undertaken – for example solar photo voltaic (PV), hydropower, energy efficient cookers – but that there was no clear or shared understanding around the relative merits of each approach. Moreover, there was no overall national ‘inventory’ of off-grid energy installations in existence – it was felt that the absence of such an inventory could be weakening regulatory oversight, and increased the risk of a fragmented, inefficient off-grid ‘sector’.

In early February 2012 the University of Strathclyde was commissioned by the SG to undertake MREAP. MREAP is an Action Research Grant made up of four separate work-streams and to date is the single largest grant awarded by SG. IOD PARC is sub-contracted to deliver the Institutional Support Programme (ISP), which included conducting the initial Evaluation and the pilot inventory in 2012. MREAP was due to close at the end of March 2014. For further information on the programme, please visit <http://www.strath.ac.uk/eee/energymalawi/> .

### *MREAP Extension*

A timeline has been outlined (figure 1) on the next page to demonstrate how the different elements of ISP and CEDP’s workstreams came together between January 2012 and the end of March 2015. An extension to MREAP was agreed by the SG in January 2014, ‘to continue and build on the work already completed under the programme, with a particular focus on community support to ensure sustainability of the programme in the longer term.’<sup>3</sup>

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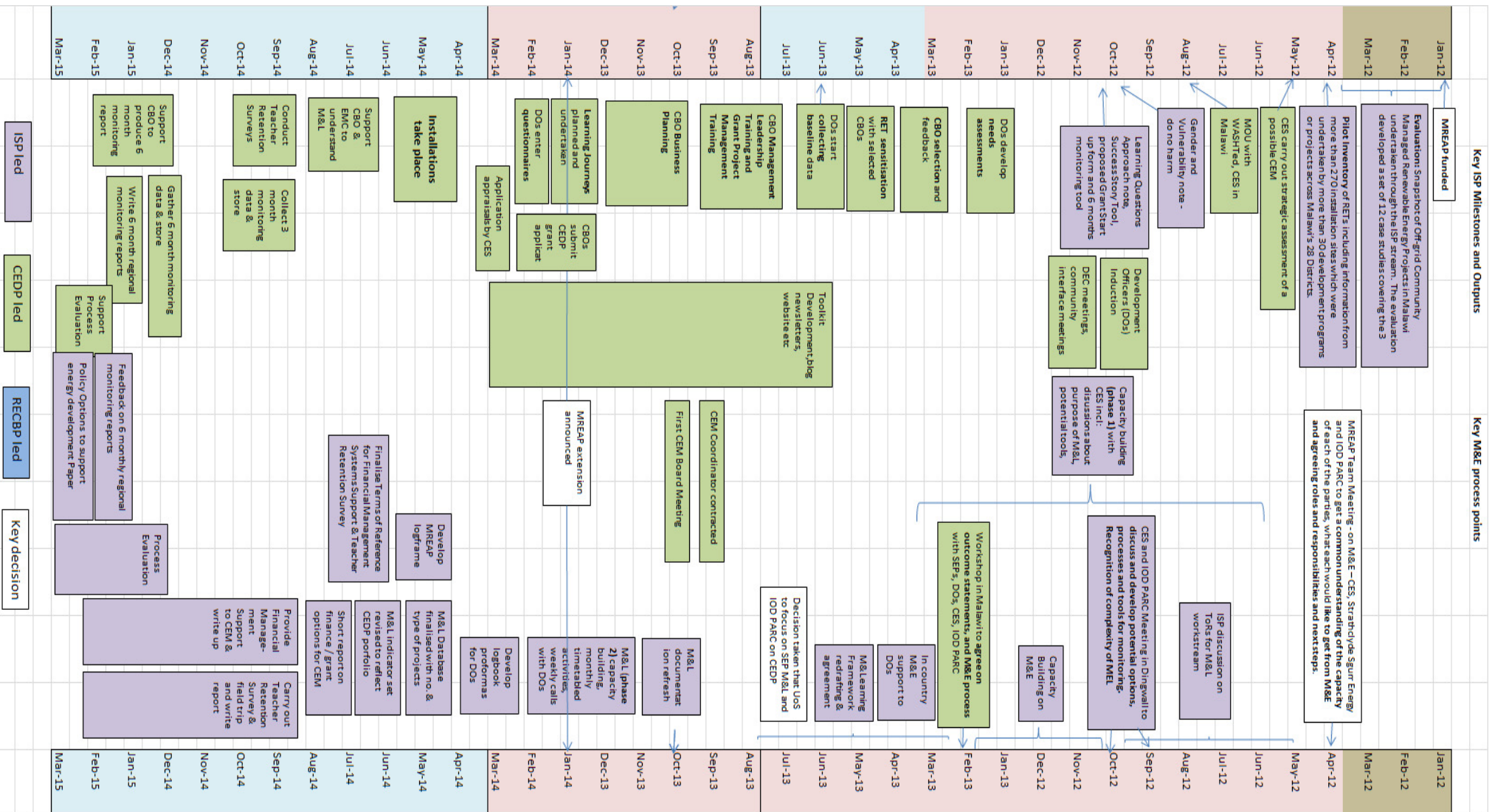
<sup>1</sup> <http://www.scotland.gov.uk/Topics/International/int-dev/strathclydeuniscopingstud>

<sup>2</sup> <http://www.strath.ac.uk/malawi/projects/communityruralelectrificationanddevelopmentcred/> accessed March 2015.

<sup>3</sup> <http://news.scotland.gov.uk/News/Energy-boost-for-Malawi-882.aspx> accessed March 2015



Figure 1: Timeline of CEDP and ISP workstreams



# Methodology

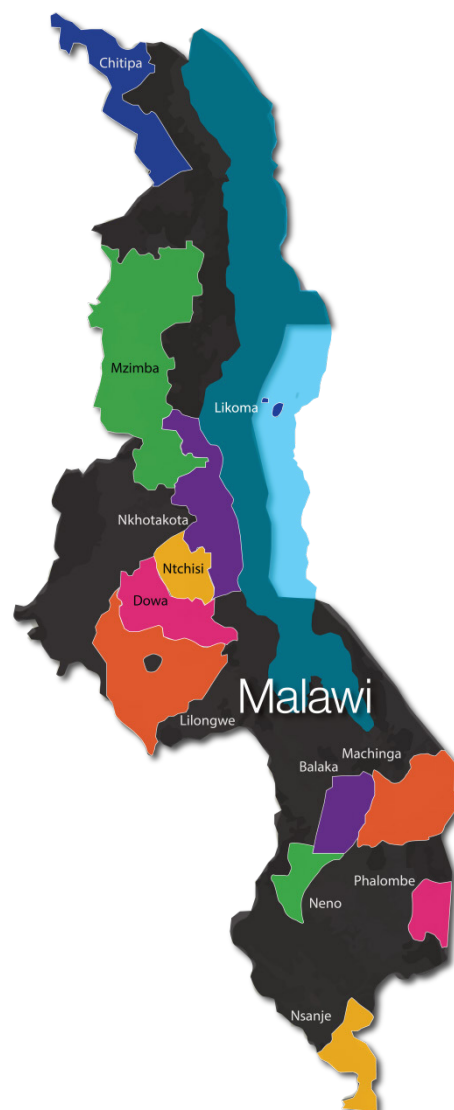
## Framing the evaluation

In all types of evaluation, it is important to ascertain the intended primary and secondary users and uses of the evaluation. The primary users of this evaluation are the SG and the GoM. They wish to use the evaluation to learn from MREAP and share these key insights with other donor partners. There are also many secondary users such as CEM, Concern Universal, Practical Action, MuREA and other local and international NGOs present in Malawi who are working on energy at the community level. Other uses include building on the indicators and data that CEDP have generated to create a bigger evidence base for what works in certain districts across Malawi.

Due consideration was also given to framing the scope of the evaluation through the choice of evaluation questions and the feasibility of what was possible.

The three major considerations for this evaluation were:

- What evidence would be available at 6 months from which to judge change (positive or otherwise);
- Given the diversity of the CEDP portfolio, what level of evaluative thinking would be possible; and finally,
- How could the evaluation itself generate data that could validate data from the M&L Framework?



## Why a Process Evaluation?

At the end of a programme, it is accepted practice to carry out an evaluation that focuses on achievement of outcomes. There is, depending on the evaluation team, generally less focus on process. Given the 3 major considerations above and the expectations that the results would be too early to point to any definitive change, a process evaluation, or **an evaluation that would help stakeholders see how CEDP had achieved what it had** was just as important as looking at the effectiveness of the programme.

By choosing a process evaluation, the evaluation team was able to frame an evaluation that also considered: the structures of CEDP and how CEDP developed. In other words, an evaluation that documented the **programme's process of implementation** and CEDP's capacity to deliver on the outcome. Given the focus of the evaluation was primarily on learning, it was agreed that a process evaluation was more likely to deliver evidence to enable programme replication where/if appropriate.

### *Evaluation Criteria*

It is standard practice when evaluating development aid to consider the Organisation for Economic Cooperation and Development (OECD) -Development Assistance Committee (DAC) criteria which were originally set out in Paris in 1991. Normally this involves evaluating 5 criteria: relevance,



effectiveness, impact, efficiency and sustainability. It is considered good practice to use and adapt these criteria to each evaluation.

The Evaluation Team, as part of the TOR, focused on: relevance, effectiveness, efficiency and sustainability. Given the timeframe of 6 months, impact was not included instead a section of results – evidence of change has been included. Furthermore, given the interest in learning from MREAP a section on innovation and replication was also included.

### *Terms of Reference*

An important step in all evaluations is to design and seek agreement from all key stakeholders on a terms of reference. An initial draft ToR was developed by the ISP team leader and circulated within IOD PARC for comment in early December 2014. Early January 2015, an IOD PARC meeting was held to finalise the draft ToR for comment, taking into consideration comments from Finance, Quality Assurance and Research. Then, a draft ToR was submitted mid-January to Strathclyde University, as the team lead on MREAP and CES (including CEM staff) for comment. Comments were received and incorporated into a final draft. This draft was then shared with the SG. In February, a report template and evaluation guidance (financial health check, district level focus group guide, interview guide, district profile proforma) were developed to facilitate the collection and aggregation of data across the various districts during the field visit. A functionality system health check proforma was developed by Peter Dauenhauer at Strathclyde. Please see Annex 3 for the final ToR.

### *Sample of projects*

The majority of CEDP projects are in remote locations, however some require even greater distances to be covered e.g. Chitipa and Nsanje. It was agreed that the minimum sample of projects (see table 1 below) to be visited would include: 9 or 20% of the total portfolio of projects, that these must be evenly spread out over the 3 regions, include a minimum of 6 CBOs and a diversity of RET applications. The final criteria for selection were: i) District with more than one project accessible during rainy season; ii) CBO office near to project; iii) Able to visit the District Offices; and finally, iv) able to meet with Group Village head and /or Village Head.

**Table 1: Final agreed sample of CEDP projects for process evaluation**

#	District	Potential Projects	Projects selected for evaluation (number)
1	Likoma	PV – 13, 14, 15 ,16	Lighting at Chipsela CDSS, Yofu primary school, Ulisa primary school, Chima primary school and 2 teachers’ houses per school (4)
2	Nkhotakota	PV – 17, 18 and stoves – 02	Lighting at Chibotera Primary school, teachers’ houses, Chinkhwamba Primary school and stoves for cooking. (3)
3	Balaka	PV – 01, 02, 03, wp – 01 and lanterns – 01	Lighting of Mpiniumodzi primary school, Nkasi primary school, Chisongwe primary school, 7 teachers’ houses, water pumping and solar lanterns for homes (5)
4	Dowa	Stoves-02, lanterns - 04	Household cooking and lighting in homes (2)
5	Machinga	PV – 04, 05, 06 and lanterns- 03	Lighting of Mpiranjala Primary school, teacher development centre, secondary school, health centre and in homes (4)
6	Nsanje	PV -01, lanterns- 04	Lighting of Bwangu Primary school, 4 teachers houses, Namiganko CBO Office and in homes (2)

In addition, to visiting a sample of CEDP projects, the evaluation team also referred to and reviewed a number of key documents associated with the implementation of the projects (application form,

business case, risk matrix, appraisal, quotes), as well as the 6 monthly regional monitoring reports and the data collected in the M&L database.

### *Evaluation Matrix*

The purpose of an evaluation matrix is to set out the questions that will be answered against the sources of information and tools/ methodologies used to gather evidence (both primary and secondary data).

The Evaluation matrix for this Process Evaluation can be found on pages 9 - 10. It clearly sets out what primary data the evaluation team used to answer the evaluation questions and where the data came from. For the purpose of this evaluation, the quality of evidence against each evaluation question has also been included. A discussion of the limitations of the data analysis is in the sub-section below.

### Assessing Quality of Evidence

The process evaluation gathered a range of evidence from a variety of sources in different districts during the field visit. The evaluation team was also dependent on CEDP’s documentation and knowledge management to be able to analyse certain issues and validate other findings. The evaluation team did not expect the quality of the evidence within and between inquiry streams (e.g. focus group discussion results from different types of projects in different districts) to necessarily be consistent given the diversity of projects present. And, in addition, it was unclear what documentation was available that would tell the story of the CEDP process. Therefore it was important to find a way of drawing attention to the quality of evidence available. Table 2 below outlines the criteria used.

***Please note that the ratings refer to the quality of evidence and not the quality of CEDP projects.***

Table 2: Criteria to assess the Quality of Evidence answering evaluation questions

Rating of Evidence	Description
<b>Robust (R)</b>	<b>Strong and robust</b> evidence from different sources which is <b>mutually supportive</b> of the conclusions that are drawn. Evidence is widespread across the operational contexts.
<b>Supportive (S)</b>	Evidence from different sources is <b>mutually supportive</b> of the conclusions that are drawn. Whilst weaknesses may be seen in some areas the <b>‘density’ of evidence provides confidence</b> in the conclusions.
<b>Indicative (I)</b>	Evidence from different sources <b>does not always agree</b> . There are general <b>weaknesses and gaps</b> and therefore the conclusions that are drawn should be seen as provisional and perhaps used as an indication that, if the topic is fundamental to an understanding of the modality that further targeted research work is required.
<b>Poor (P)</b>	<b>Limited evidence</b> available from any source. Main evidence <b>limited to ‘hearsay’</b> and very localised experiences. The main conclusions that are possible in this situation would be that further work may well be required in these areas, especially if significant claims to operational effectiveness are required.
<b>No evidence (N)</b>	<b>Too early</b> for M&L Framework to provide conclusive results and/or for there to be validation in M&L Framework of results emerging from community focus group discussions and/or key informant interviews. Where possible, the evaluation team have looked for where future evidence may be generated against which results can be validated.

## Evaluation Process and workplan

To clarify, supplement and triangulate information identified from the document review the evaluator conducted key informant interviews and focus groups while in country. A full breakdown can be found in Annex 2. In total over 100 people contributed to this process evaluation.

Once data gathering was finalised, the evaluator worked to compile findings under the key evaluation criteria. On the 11<sup>th</sup> February 2014, interviews were held with CES project manager Georgy Davis and Sarah Jones (who developed the CEM toolkit and provided support to DOs) to further inform the analysis. These emerging findings were then the topic of a day long workshop on Monday 2<sup>nd</sup> March 2015 with MREAP project manager Peter Dauenhauer to support efforts to fill gaps and analyse the collated data further. Final interviews were held with Peter Dauenhauer 10<sup>th</sup> March and Damien Frame (MREAP project manager 2012 - 2014) on 11<sup>th</sup> March. A zero draft of the report was then shared on 13<sup>th</sup> March with CES and Strathclyde University in advance of the PSG to give them opportunity to comment prior to emerging findings being shared for discussion at the PSG.

The PSG, held in Lilongwe, Malawi on March 18<sup>th</sup> 2015, represented an opportunity to obtain comments on the findings, conclusions and recommendations from all of MREAP's SEPs, CES, Sgurr Energy as well as the Ministry of Finance, Ministry of Energy from the Government of Malawi and the Head of the International Development Department from the Scottish Government. The feedback was then incorporated into a first draft report which was officially circulated amongst MREAP partners on March 22<sup>nd</sup> for final comment. At this point, the report was also fully quality assured by Sheelagh O'Reilly, a director of IOD PARC.

In summary the process followed 7 key steps.

### *Step 1: Terms of Reference drafting and site selection, December 2014 – January 2015*

Early and participative development of the ToR and selection of appropriate sample of projects. Finalisation of evaluation guidance, report template and evaluation framework.

### *Step 2: Enquiry field visit & document review, 1<sup>st</sup> to 8<sup>th</sup> February 2015*

Two evaluators conducted field trips to the North and Centre, and to the Centre and South. Each evaluator produced a standard set of documents after each project visit so that a consistent set of data was generated. Primary data was collected and verified on systems performance, community benefits, and community challenges at village, community and district level.

The evaluation team reviewed all information in the dropbox of relevance to the evaluation. It also requested additional documentation on costs and expenditure from CEM as well as more detail on what training was conducted and when from the DOs. The evaluation team also requested a summary of expenditure from Strathclyde (on suggestion and approval by CES) of CEDP in order to analyse data for the efficiency section of the report.

The regional 6 monthly monitoring reports were used to validate and verify primary data and to fill gaps in information.

### *Stage 3: Analysis, 2<sup>nd</sup> – 9<sup>th</sup> March 2015*

The team drew together their findings against each question/objective and analysed the main themes emerging from their evidence.

### *Stage 4: Write up zero draft & assess quality of evidence, 9<sup>th</sup> to 13<sup>th</sup> March*

An early (pre-first draft) report was shared with internal partners to facilitate greater sharing of information and evidence where necessary.

*Stage 5: PSG meeting, feedback and first draft released for comment, 22<sup>nd</sup> March 2015*

The PSG provided an ideal platform to feedback to CEM and wider stakeholders the main findings of the evaluation. Comments were incorporated and a first draft was sent out again to a wider MREAP stakeholder group (SEP partners and CEM) for comment.

*Stage 6: Quality Assurance, 25<sup>th</sup> – 27<sup>th</sup> March 2015*

The first draft of the process evaluation was shared with Sheelagh O'Reilly who provided a very comprehensive and critical QA of the report.

*Stage 7: Final Draft of Process Evaluation Report, 30<sup>th</sup> March to 1<sup>st</sup> April.*

This involved incorporating the comments from all MREAP stakeholders, including the QA comments and submitting a second and final draft to Strathclyde University for submission to SG.

## Evaluation Matrix

Table 3 sets out the primary evidence used in the process evaluation and the rating in terms of **quality of evidence** at question level. Again please note the rating is in reference to the quality of evidence and not the quality of CEDP results.

**Table 3: Evaluation Matrix**

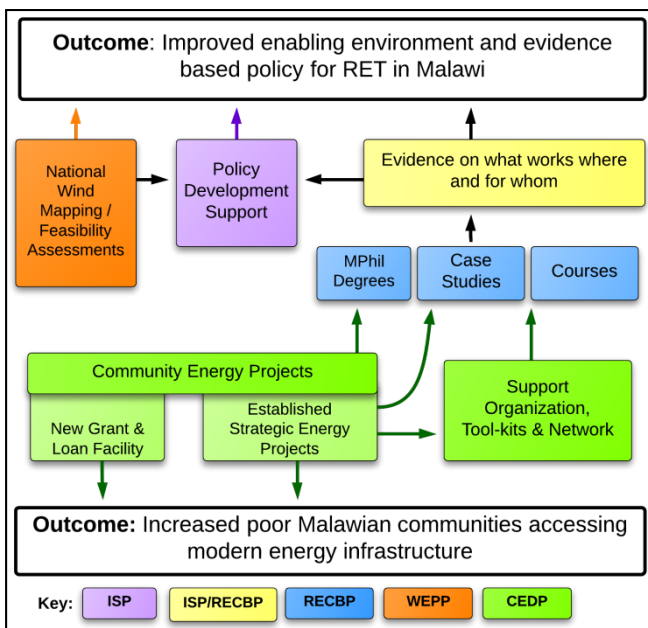
DAC Criteria	Primary Evidence Source and tool	Rating
<b>Relevance</b>		
<ul style="list-style-type: none"> <li>To what extent do off-grid energy management interventions contribute to district developmental plans and objectives?</li> </ul>	<ul style="list-style-type: none"> <li>Document Review (e.g. National Education Strategy, District Development Plans)</li> <li>Interviews and Focus Groups at district, CBO and village level</li> <li>6 monthly regional monitoring reports &amp; validation at local level of monitoring data</li> </ul>	N
<ul style="list-style-type: none"> <li>What evidence is there of off-grid energy provision contributing to gains in other domains (economic development, education, gender issues, health, WASH, etc.)?</li> </ul>	<ul style="list-style-type: none"> <li>Document Review (District Education Plans)</li> <li>Validation at local level of monitoring data &amp; Focus group discussions and key informant interviews at district, CBO and village level</li> </ul>	N
<ul style="list-style-type: none"> <li>How relevant was the approach taken by CES to community managed RET projects? How appropriate was the capacity building approach at the CBO and individual project level?</li> </ul>	<ul style="list-style-type: none"> <li>Validation at local level of monitoring data</li> <li>Focus group discussions and key informant interviews at district, CBO and village level</li> </ul>	I
<b>Efficiency</b>		
<ul style="list-style-type: none"> <li>What was funding spent on?</li> </ul>	<ul style="list-style-type: none"> <li>Document review</li> <li>Financial health check analysis &amp; functionality analysis</li> <li>Focus group discussions and key informant interviews at sub- district, CBO and village level</li> </ul>	P
<ul style="list-style-type: none"> <li>What does an analysis of the project evidence suggest about the efficiency of different types of installations?</li> </ul>	<ul style="list-style-type: none"> <li>Document review</li> <li>Validation at local level of monitoring data</li> <li>Financial health check analysis and lifecycle costing model development</li> <li>Rating of 3 CBOs efficiency &amp; functionality analysis</li> </ul>	P / N
<ul style="list-style-type: none"> <li>Value for Money: How well co-ordinated and managed are <i>individual</i> off-grid energy management interventions? How well co-ordinated and managed are off-grid interventions across and between actors <i>at the national level</i>?</li> </ul>	<ul style="list-style-type: none"> <li>Document Review</li> <li>Value for Money 3 Es framework analysis</li> <li>Validation at local level &amp; focus group discussions and key informant interviews at sub- district, CBO and village level</li> </ul>	I / P

DAC Criteria   Primary Evidence Source and tool		Rating
<b>Effectiveness and results- evidence of change</b>		
<ul style="list-style-type: none"> <li>What are the most effective off-grid energy management projects overall? (Taking into account social, economic, environment and developmental factors, in addition to technical performance)</li> </ul>	<ul style="list-style-type: none"> <li>Document Review</li> <li>Analysis of M&amp;L Framework data and validation at local level</li> <li>Functionality analysis</li> <li>Including all focus group discussions and key informant interviews at District, sub-district, CBO and village level</li> </ul>	N
<ul style="list-style-type: none"> <li>How effective was the use of the Community Based Organisations to manage the interventions?</li> </ul>		I
<ul style="list-style-type: none"> <li>To what extent are the off-grid energy management interventions contributing to development outcomes?</li> </ul>		N
<b>Innovation and replicability</b>		
<ul style="list-style-type: none"> <li>What elements of the process were innovative and/or replicable?</li> </ul>	<ul style="list-style-type: none"> <li>Document Review</li> <li>Validation at local level</li> <li>Functionality analysis</li> </ul>	P/ N
<b>Sustainability</b>		
<ul style="list-style-type: none"> <li>How is the issue of sustainability approached in the projects that were visited? What elements are in place that support or detract from project sustainability, in practice?</li> </ul> <ol style="list-style-type: none"> <li>Quality control, supervision throughout the operations and maintenance (O&amp;M) continuum (from design, through installation and maintenance, contracting, warranty).</li> <li>Roles, responsibilities and organisational capacity for sustained operations and adequate maintenance.</li> <li>Evidence of initial and ongoing project acceptance/support/buy-in within the community and stakeholders.</li> <li>Project level revenue generation and financing of O&amp;M. Ability of projects to meet current savings targets to ensure long-term (5 year) financial sustainability.</li> <li>Business planning process (including design, implementation and performance)</li> </ol>	<ul style="list-style-type: none"> <li>Document review</li> <li>Validation at local level</li> <li>Functionality health check analysis</li> <li>Support/Detract factor analysis</li> <li>Risk analysis</li> <li>Including all focus group discussions and key informant interviews at District, sub-district, CBO and village level</li> </ul>	S
<ul style="list-style-type: none"> <li>Risk Analysis: From the study, if CBO management is the model MREAP recommends what do we perceive to be the risks given that it is a relatively new model that needs to be managed?</li> </ul>	<ul style="list-style-type: none"> <li>Risk Analysis</li> <li>Document review</li> </ul>	S

## Data Limitations and Challenges

The CEDP portfolio is varied in many aspects: range of technologies, applications, end-users, community ownership models and beneficiaries. In order to gather data that can be evaluated across the whole portfolio of projects, a M&L Framework was developed with a system that would generate data to be evaluated. The system provided evidence from: database indicators, CBO 6 monthly reports, Regional 6 monthly reports and this process evaluation. Figure 2 below helps explain the dependencies between components (CEDP, RECBP and ISP) on delivering process documentation.

**Figure 2: MREAP programmatic structure with outcomes**



This diagram shows how the CEDP stream contributes directly to the second MREAP objective via implementation and funding of community energy projects and the establishment of support organizations, networks, toolkits and process. All streams contribute to the first MREAP objective by a process either directly through their main objective (i.e. WEPP feasibility studies and wind mapping) or via an overlay of monitoring and knowledge capture. Critical tools to capture learning from MREAP are a Research Framework for RECBP and the Monitoring and Learning framework for CEDP.

The pale yellow box (evidence on what works, where and for whom) is designated the responsibility of ISP/ RECBP. CEDP were not responsible for producing this evidence. However

ISP and RECBP were dependent on them to: i) deliver the CEDP projects; and, ii) to have supporting documentation and evidence on what they did, how they did it and so on. For this process evaluation there was therefore an equal dependency on gaining timely access to the documentation, information and evidence required to detail, verify and validate what happened.

The physical distance between the CEM and ISP teams meant that there were limited opportunities to come together and discuss evidence and information. One of the ways in which the teams attempted to narrow this distance was through a shared dropbox folder in the final year of the programme. The ISP lead reviewed all documentation contained within the CEDP dropbox for the evaluation, in particular the following folders: i) CBO appraisal forms; ii) grant administration files for each region and district; and, iii) learning journeys. The needs assessment folder was reviewed as part of the baseline review document. While every attempt has been made to validate the information contained within these folders and also to request additional information when necessary, it still may be the case that the Development Officers hold additional relevant material on their own laptops. For example, when building the excel models for the lifecycle costing; only the data from the approved business plans was used. However the Northern Region DO said that she had also modelled costs but that the spreadsheet was not in the dropbox. Unfortunately, without access to this additional evidence and information, the evaluation team has had to rely on the dropbox being an accurate and up to date repository of information.



### *M&L System challenges*

There were also challenges for the Monitoring & Learning (M&L)<sup>1</sup> system. These can be categorised into two areas:

1. As a result of the focused community level work, where participants in the process designed elements to suit local needs, extensive efforts had to be made to produce a consistent set of data across CEDP.
2. Given that the detailed community process was very time-consuming, the ability to generate consistent information on a timely manner was reduced.

In addition, the relative formality of developing an M&E system that would enable ‘proof of concept’ as well as enumerate scope and scale of benefits for a range of different individuals and households is a challenge in this context. CES and the DOs were focused on the difficult technical challenges as well as the community facilitation such that the additional requirements for M&E were, as often happens, seen as secondary in nature.

To compound matters, there was no budget for M&L in DO workplans or their activities for the first year of their employment. It is unclear why this was the case. The MREAP extension however dedicated funds to M&L for CEM and to ISP to support the DOs. However in spite of this, the DO’s capacity constraints continued to prevail and limited their availability for M&L and also the data they were able to provide. In general M&L data collection costs have been kept to a minimum by moving away from household data collection (except for those teachers’ houses where solar PVs were installed) or resource intensive processes (such as measuring firewood collection times/weighting). However on a couple of occasions it was necessary to employ the support of external researchers to collect data and enter data online for sharing and analysis.

### *M&L Framework*

There are two important types of limitations of the M&L Framework that need to be understood. Those that are due to a lack of time for implementing the framework ex post installation and those that are more systemic.

The monitoring of the projects began post installation in May 2014. The installations had originally been envisaged for 2013, the knock-on impact is a reduction in the amount of data available against projects implemented. The time factor also limits what it is reasonable to interpret - at 6 months it is generally too early to provide evidence of sustained changes in livelihoods.

In addition, when the projects were delayed, the initial indicator set became over over-ambitious for the timeframe and was rationalised (reduction in the amount and type of indicators). As such, the M&L Framework does not contain information relating to qualitative change at the community or household level.

The M&L Framework is limited in a more systemic sense because it does not build on detailed household level changes. Resources were not dedicated to the measuring of firewood or cooking times to be able to evidence change for the cookstove projects. It is also limited because ISP was not part of the project design phase. For example, it only became aware of the sale of solar lanterns at a very late stage when the business model had been agreed with the community. It was agreed that it was not possible to ask the community to monitor those who bought the lanterns because this would be too great a burden on top of managing a new social enterprise. The M&L Framework therefore only sets out the total number of units (for both cookstoves and solar lanterns) that were bought, returned and

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<sup>1</sup> Please see annex 1 on Monitoring and Learning



replaced. Finally, while every effort was made to disaggregate data based on gender, the M&L Framework does not detail number of vulnerable or excluded beneficiaries.

### *Indicator Limitations*

A monitoring and learning annex was attached to the application forms the CBOs had to complete to be awarded a CEDP grant. This original annex included the following indicators:

- **Indicator 1** - % increase in number of households by female and male headed households in target areas with access to electricity across the district.
- **Indicator 2** - No. of vulnerable people in target areas using renewable energy services and/or energy efficient measures across the district
- **Indicator 3** - % growth of fund for operations and maintenance over time in the district.
- **Indicator 4** - % reduction in quantity of fuel wood used per month by target households (and split by FHH and MHH) across the district
- **Indicator 5** - Qualitative evidence of coordination between existing structures and existing committees across the district
- **Indicator 6** - Energy Expenditure (including initial capital purchases and ongoing fees) broken down into types (wood, charcoal, kerosene, dry-cell batteries, electricity monthly fees, etc.) at household and community level across the district
- **Indicator 7** - Increased retention of school teachers and health clinic workers across the district

Guidance was developed on an indicator by indicator basis (please see annex 10) by Strathclyde University with support from IOD PARC on how to capture data, fill out the database with the data and how this data linked to the monitoring forms at 6 months for each CBO and at the regional level.

During the months of May and June 2013 the draft Monitoring and Learning Framework (developed by ISP team leader) was critically assessed against the DO and SEP experience of monitoring with community based organisations in the field in Malawi. The full rationale behind this original set can be found in Annex 4 but for the purpose of this report, table 5 below summarises: how data was to be collected, why it was important and who also could benefit from this data. In summary, the ISP team deliberately tried to harmonise indicators with internationally established indicators alongside developing indicators that would build evidence of what works and what doesn't in Malawi itself. The basket of indicators included both qualitative and quantitative measures. Common to the field of energy development is the measurement of **access**. MREAP adopted the same approach. It is important to draw attention to the fact that the M&L indicators are measuring both access to **electricity and energy efficiency**.

### *Data analysis limitations*

Table 4 below sets out the key tool terms used in the evaluation matrix, their description to facilitate comprehension with the limitations of the data analysis. The limitations of the analysis are in the main related to the paucity of data for their purpose. It was the evaluation team's choice to use these tools and it is left to the reader's judgement to ascertain whether or not the availability of the data for such an analyses is or is not good enough.

**Table 4: Data analysis descriptions with limitations**

Key term from Evaluation Matrix <i>with description</i>	Limitations of data analysis
<b>Monitoring data</b> from the M&L Framework.	Evidence was not collected for all projects against all indicators. While a counting ‘protocol’ was put in place, it was not possible to verify all data in M&L Framework during the field visits.
<b>Document review</b> of CEDP dropbox.	Only limited folders contained documentation relevant to the review. Gaps in documentation include: what training happened, where, how often, on what topic, as well as documentary evidence of expenditure.
<b>Financial health check</b> was conducted by asking a set of questions with regards to: bank account, roles and responsibilities, logbook verification, transaction QA and so on with each CBO.	Only completed with 50% of CBOs in project visits (Likoma, Dowa and Nkhotakota). Evaluation team was unable to complete for Balaka and Machinga, while the CBO was not visited in Nsanje.  Please see Annex 5 for the results of the financial health checks.
<b>Functionality checks</b> and analysis looked at the status of the working parts of the system, namely: solar panels, charge controllers, inverters and loads.	Very minor limitations. Functionality checks were carried out on all sites visited. The full and complete breakdown of these results can be seen in Annex 7 and the proforma used to collect the results can be found in Annex 6.
<b>Lifecycle cost<sup>2</sup> model</b> development was done using data from Business Plans supplemented with data from M&L Framework.	A lifecycle cost model was created for one CBO from each region. Each CBO ran different projects so the models are not comparable. There were also gaps in data which made it impossible to model beyond a year for one CBO.
<b>Rating CBO efficiency</b> on the basis of M&L data (and original business plans) whether or not the CBO was on track to meet its 9 month income target.	The 9 month target was not included in all business plans. It was therefore not possible to assess the efficiency of those CBOs.
<b>Value for money analysis</b> adopted the 3 Es approach.	CEM was able to provide additional documentation when in Malawi for the PSG. However due to the delay in providing expenditure data it was not possible to use evidence to confirm figures provided nor make a judgment about whether or not the data is sufficient from which to build future budgets and forecast. Annex 4 sets out the high level lifecycle models in excel.
<b>Support/Detract</b> factor analysis for sustainability involved listing all the factors and generalising about whether that factor on the whole supported the sustainability of CEDP projects.	The analysis is limited because the method for assessing the overall sustainability was based on generalisations.
<b>Risk Analysis</b> set out the factors that are of high importance to mitigate to ensure CEDP’s sustainability.	CEM Board did not input into this analysis. Comments were received from Georgy Davis (CEDP Project Manager).

<sup>2</sup> A lifecycle costing approach seeks to raise awareness of the importance of life-cycle costs in achieving adequate, equitable and sustainable services. There have been great advances in the use of the approach in the Water, Sanitation and Hygiene (WASH) Sector. Please see IRC website for more details. <http://www.ircwash.org/projects/life-cycle-costing-tools> accessed March 2014.

**Table 5: M&L indicator set development**

Original Indicator	Final indicator	Reason for adaptation	'WHAT' projects focused on.....	'HOW' methods to collect and store data	'WHY' collect data against this indicator?	'WHO' is collecting data against this indicator?
Indicator 1: % increase in number of households by female and male headed households in target areas with access to electricity across the district.	Indicator AA: % increase in access to electricity for community schools across District  Indicator DD: % increase in number of households by female and male headed households in target areas with access to electricity (Solar PV Home systems) across the district	Cost of measuring at household level beyond unit of school and teachers' homes.  Solar PV home systems were only put in teachers' homes.	Solar PV for Schools  Solar PV for teachers' houses	Monthly through CBO logbook  Stored on database	Most donors or INGOs talk of % <b>increase in access</b> and use the unit of the <b>household</b> . It will mean MREAP has data that is relevant to key stakeholders.	UNDP, Practical Action and the Government of Malawi for reporting against the Malawi Growth and Development Strategy 2012.
Indicator 2: No. of vulnerable people in target areas using renewable energy services and/or energy efficient measures across the district	Not possible to recreate this indicator. However in CEDP's single health clinic, the following was monitored - Indicator CC: Number of safe and healthy deliveries	Important to choose an indicator with data readily available and a less costly method.	Fuel efficient cook stoves  Solar lanterns	Monthly through CBO logbook  Stored on database	This indicator builds on indicator 1 and looks further at the <b>use of energy</b> in a subset of the population. <b>Vulnerable groups</b> are: girls, elderly, people living with disabilities, people living with HIV/AIDS, female headed households and ethnic minorities. Use is defined to include (but not limited to): those who access lighting at night at school, or additional lighting through the day; through attending a health clinic; being visited by a midwife or nurse from a health clinic (vaccination, antenatal appointments etc as appropriate) using energy efficiency cookstoves; those who use energy at trading centres...etc.	This is an indicator being used by UNDP in their current programme. The intention was that by harmonizing data reporting with theirs (even at this very small level) it would be possible to add to their data and support a greater evidence base for who is gaining access and what this means.
Indicator 3: % growth of fund for operations and	Remained the same and became indicator FF	Not applicable	Solar PV for health centre  Solar PV for	DO will establish baseline for	From the learning field trips and from experience in other relevant sectors such as WASH, it is important to build evidence around the challenges of sustainability and	Both Practical Action and SolarAid are currently looking at monthly

Original Indicator	Final indicator	Reason for adaptation	'WHAT' projects focused on.....	'HOW' methods to collect and store data	'WHY' collect data against this indicator?	'WHO' is collecting data against this indicator?
maintenance over time in the district.			<p>primary schools</p> <p>Solar PV for secondary schools</p> <p>Solar PV for CBO offices</p> <p>Solar PV for teachers' house</p> <p>Solar PV for water pumping</p>	<p>fund, note opening balance of bank account or other method for savings, then monitor at 6 monthly intervals.</p> <p>Verified thru bank statements or witnessed community management group statements.</p>	<p>provide data on how income generated by RET systems is and is not spent on operations and maintenance. While the time period for MREAP projects is limited. It is still beneficial for all projects to approach community engagement openly and raise issues of sustainability, lifecycle costing and the potential burden of RET systems on the poorest households.</p>	<p>monitoring systems for feeding data back on income generating activities e.g. phone charging, room hire, video shows, barber shops etc. In most instances this is deposited in a bank account and is therefore independently verifiable. SolarAid beneficiaries have for example set up an account called solar maintenance into which all income is deposited. Within one year SolarAid verifies bank accounts once every 3 months.</p>
Indicator 4: % reduction in quantity of fuel wood used per month by target households (and split by FHH and MHH) across the district	Indicator EE: Number of distributed improved stove and solar lanterns throughout CBO as well as number returned and replaced	Too expensive to measure changes at individual household level and also indicator had to be appropriate to capacity of CBOs	Fuel efficient cook stoves	<p>Measuring change in quantity;</p> <p>Monthly through CBO logbook</p> <p>Stored on database</p>	<p>It is crucial when samples are small to combine datasets where possible and to build coherence and greater understanding on certain specific issues. This indicator covers MREAP's responsibility as an energy and environment related programme to contribute to the reduction in carbon emissions and provide evidence of how households are tackling locally relevant climate change problems e.g. deforestation.</p>	<p>Concern Universal's successful implementation of the Balaka Programme used this indicator and therefore it is highly relevant for MREAP to do so also.</p>
Indicator 5: Qualitative evidence of coordination between existing structures and	Not included for formal monitoring	To be picked up by formal process evaluation	<p>Solar PV for health centre</p> <p>Solar PV for primary</p>	<p>Most significant change method</p> <p>Focus groups</p>	<p>A good basket of indicators creates a rich set of data from which progress towards an objective or outcome can be assessed. So far the indicators cover the standard energy access indicator, access and use by vulnerable groups,</p>	None known

Original Indicator	Final indicator	Reason for adaptation	'WHAT' projects focused on.....	'HOW' methods to collect and store data	'WHY' collect data against this indicator?	'WHO' is collecting data against this indicator?
existing committees across the district			<p>schools</p> <p>Solar PV for secondary schools</p> <p>Solar PV for CBO offices</p> <p>Solar PV for teachers' house</p> <p>Solar PV for water pumping</p>	<p>Semi-structured interviews</p> <p>At 6 month point.</p> <p>Store in project database.</p>	<p>an indicator that looks at the sustainability of engagement through the logic of provision for operations and maintenance and the dimension of environmental accountability is reflected in indicator 4. Indicator 5 looks to assess how effective community engagement has been. We wish to understand if the off-grid implementation of RET systems are more sustainable if the process builds community coherence through transparent processes of coordination.</p>	
Indicator 6: Energy Expenditure at household and community level across the district	<p>Indicator GG: Energy expenditure at household level broken down by type over time</p> <p>Indicator HH: Capital expenditure at household level on electrical items</p>	Only able to monitor teachers' home expenditure	<p>Solar lanterns</p> <p>Solar PV for primary schools</p> <p>Solar PV for secondary schools</p> <p>Solar PV for teachers' house</p>	<p>Monthly through CBO logbook</p> <p>Stored on database</p>	<p>Includes initial capital purchases and ongoing fees) broken down into types (wood, charcoal, kerosene, dry-cell batteries, electricity monthly fees, etc.)</p> <p>To build a full and complete picture of the outcome of off grid RET system installation it is important to understand the costs associated for households. These costs will allow ISP to understand the burden of fees, repair costs etc</p>	Practical Action
Indicator 7: Increased retention of school teachers and health clinic workers across the district	Indicator BB: School population figures and entrance rates for primary school leavers	Too short a period (6 months) to monitor and report changes at 'retention level' however the	<p>Solar lanterns</p> <p>Solar lanterns for health centre</p> <p>Solar PV for primary schools</p>	<p>Collect baseline number of teachers per primary and secondary school for each project</p> <p>Monitor this at the six month</p>	<p>Indicator 7 data will build a small but independently verifiable dataset from MREAP which can demonstrate that in x schools and x health clinics we have contributed towards the retention of teachers and nurses. The data is currently monitored at a district level. We will work with local education and health offices to illustrate change in retention and also, where possible, change in calibre of teacher. There is evidence (limited at present) that suggests</p>	Data from this indicator will build on the work of SolarAid who are also actively trying to link the contribution of RET systems to the retention of professional workers. At this stage MREAP is not able to monitor

Original Indicator	Final indicator	Reason for adaptation	'WHAT' projects focused on.....	'HOW' methods to collect and store data	'WHY' collect data against this indicator?	'WHO' is collecting data against this indicator?
		general pattern of school population figures would give a shape to what is happening. Supported by additional research on teacher retention early changes in Chitipa District	Solar PV for secondary schools Solar PV for teachers' house	point Use data from District Offices and verify with school records. Record and store in project database.	potential candidates expect electricity (lighting, TV, fridge) in accommodation and in school/clinic. As such, it is put forward that those who can choose places would not choose a school or clinic without these basic services. The hypothesis is therefore that retention is a function of access and use of electricity and modern energy services.	against impact however it is important to state that our assumption is that the implementation of small off grid RET systems which are community managed could lead to improved livelihoods for all beneficiaries.

The period of extension (April 2014 – March 31<sup>st</sup> 2015) afforded CEDP the time to install the projects. Projects were mostly installed by the 31<sup>st</sup> May 2014 and therefore monitoring began from this date on the following final set<sup>1</sup> of indicators: Indicator AA: % increase in access to electricity for community schools across District; Indicator BB: School population figures and entrance rates for primary school leavers; Indicator CC: Number of safe and healthy deliveries; Indicator DD: % increase in number of households by female and male headed households in target areas with access to electricity (Solar PV Home systems) across the district; Indicator EE: Number of distributed improved stove and solar lanterns throughout CBO as well as number returned and replaced; Indicator FF: % growth of fund for operations and maintenance over time; Indicator GG: Energy expenditure at household level broken down by type over time; and, Indicator HH: Capital expenditure at household level on electrical items.

The set focuses on building evidence of access to modern energy services and improved energy efficiency by collecting information on: the number of schools with access, the difference this access has had on enrolment levels, the number of households with improved lighting at home (through solar lanterns) and/or improved stoves. It was also agreed to explore the immediate effects of access to energy on household and capital

<sup>1</sup> Please see annex 14 for background to compiling the original set of indicators.

expenditure of those who have gained access through solar PV (teachers' houses). A single health clinic was monitored to witness the changes that lighting in a delivery suite could have on the number of healthy babies being delivered. A full discussion of the limitations of this dataset can be found in the next chapter.

### *Timing of Country Visit*

The evaluation team were aware that they would be visiting during the rainy season, but unfortunately in late January and early February 2015 Malawi experienced its worst flooding in over 30 years. Roads that would normally be difficult now became impassable as bridges were swept away. The lower Shire basin flooded and many lives were lost. The team were sensitive to making excessive demands on District level officials and communities for participation in the evaluation at a time of humanitarian crisis.



# Findings

## Structure of chapter

The evidence from the evaluation process will now be presented by evaluation criteria. Each findings section will begin with the title of the criteria e.g. Relevance, then a brief introduction to the criteria will be given. The section then presents the evidence against each evaluation question by: i) firstly setting the context for the results (where appropriate); ii) indicating any challenges that have been encountered; and, iii) providing evidence against the criteria question. The findings begin with relevance.

## Relevance

This first section of the process evaluation findings analyses the extent to which CEDP projects have been relevant to existing district level objectives and plans as well as whether, at this early stage, there is any evidence of CEDP projects contributing to development gains in other sectors. It concludes with an analysis of the relevance of the approach taken by CES to community manage RET projects and an assessment of the appropriateness of the capacity building approach at the CBO and individual project level.

*1. To what extent do off-grid energy management interventions contribute to district development plans<sup>1</sup> and objectives? 2. What evidence is there of off-grid energy provision contributing to gains in other domains (economic development, education, gender issues, health, WASH etc)?*

- At present the current MGDS II focuses on large scale infrastructure development (or rural electrification) in rural areas to improve access to electricity. There is currently no Renewable Energy Policy or Strategy for off grid rural communities in Malawi against which to judge MREAP's contribution. While the profile of Sustainable Energy for All has increased the global and national level of attention on energy, there still remains a long way to go to address the lack of coverage in Malawi (where 99% of rural Malawians do not have access to electricity<sup>2</sup>). It is therefore reasonable to assume that a significant proportion of energy access could be provided by RE projects in off-grid locations. Based on this assumption the learning from CEDP projects is highly relevant to national level policy makers as well as district officials.
- It was not possible to gain access to any district development plans for the CEDP districts sampled for the evaluation. In 4 cases (out of the 6 districts visited) the plans were being revised and in the remaining 2 the plans could not be found and/or shared. Therefore an alternative district level plan against which to judge relevance had to be found. The greatest number of projects has been in educational institutions (27 projects) and therefore arguably CEDP's most relevant area of contribution is in the education sector. The evaluator assessed the evidence against 3 District Education Plans (DEPs) of Nkhotakota, Nsanje and Machinga.

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<sup>1</sup> All District Councils are mandated to produce a comprehensive District Development Plan (DDP) under the Local Government Act (1998). It sets out what is planned for a three year period. The District Executive Committee (DEC) facilitates the process of district development planning and management. The DDPs must be aligned to the current national level planning documents namely: Malawi Growth and Development Strategy II, Vision 2020, Public Sector Investment Programmes and National Decentralisation Policy. Each DDP sets out the total budget available for each sector.

<sup>2</sup> <http://data.worldbank.org/indicator/SI.POV.DDAY> accessed March 2015



- Districts must currently report on education under the MGDS II theme of social development, sub-theme education. Each District Education Office is responsible for delivering a District Education Plan (DEP) against the National Education Sectoral Plan (NESP) goals. The goals are: i) Quality and Relevance; ii) Access and Equity; and, iii) Governance and Management. Each District plans educational priorities against each of these goals.
- There is evidence of relevance against the ‘quality and relevance’ educational theme.
- An analysis of the current DEPs for the period 2013-2017 in Nsanje, Balaka and Nkhotakota demonstrates that in the main there are similar problems being addressed across these MREAP districts e.g. building classrooms, constructing teachers’ houses and toilets, and that the promotion of **Quality and Relevance** of education dominates (e.g. 66% of total funding to education sector in Nsanje and in Balaka it represents 87%) plans.

**Table 6: Number and type of CEDP projects across regions**

Region	Central	North	South	Totals
<b>Cooking</b>				
Cookstoves	2	2	0	<b>4</b>
<b>Lighting</b>				
Institutional Lighting (CBO)	0	2	1	<b>3</b>
Institutional Lighting (Health Centre)	0	0	1	<b>1</b>
Institutional Lighting (Primary School)	4	13	4	<b>21</b>
Institutional Lighting (Secondary School)	0	3	1	<b>4</b>
Institutional Lighting (Teacher Development Centre)	0	1	1	<b>2</b>
Solar lanterns	4	1	4	<b>9</b>
Teaching households	7	29	34	<b>50</b>
<b>Pumping</b>				
Water Pumping	1	1	0	<b>2</b>
Grand Totals	18	52	26	<b>96</b>

Evidence suggests that the majority of CEDP projects targeted the poorest and hardest to reach communities based on distance from nearest trading centre and health clinic. Nsanje and Chitipa Districts are two of the poorest and with the most remote and hardest to reach schools. Targeting Nyamadzere Zone for example in Nsanje district is a 400km roundtrip from Nsanje Boma and a significant undertaking for the Southern Region Development Officer. While Chitipa District was not visited as part of the evaluation, separate research<sup>3</sup> demonstrated the commitment of the Northern Region Development Officer to also target the most inaccessible, remote rural communities. Currently

not even District Officials are able to dedicate sufficient resources to go to Nyamadzere zone in Nsanje because of the time investment required. The zone only gets 50% of its required supervision and monitoring. In addition, Nyamadzere zone has the highest pupil-teacher ratio of 122:1 and a PSLCE pass rate of 51% (Nsanje District).

Consistently across all projects visited for the evaluation, the evidence from the focus group discussions and key informant interviews suggested that at 6 months of CEDP contributing to the first thematic NESP Goal 1 of improving quality and relevance. Based on an analysis of data from focus groups and interviews against the DEPs, it was found that the new lighting in 21 primary schools and 4 secondary schools helps teachers to:

- Prepare lessons and mark work;
- Give additional classes: catch up and specific subjects;
- Improve time management: teachers can plan better preparation for examination;
- Improve quality of teaching: increase in number of teachers, increase time of learning for the teachers themselves – increased use of school library for professional and educational;
- Improve motivation and wellbeing : access to light at home, better pupil attention in class;
- Improve management of space for teaching versus studying; and,
- Reduce the % of teachers doing double shift: increase in number of teachers to district and increased retention of staff at school.

It is therefore expected that over time<sup>4</sup>, if CEDP projects are sustainable, they will be highly relevant to existing DEPs and could make a modest contribution to zonal level changes in: Increased teacher retention<sup>5</sup> in rural remote schools; and, a reduction in pupil/qualified teacher ratio in each education zone. However, the benefits to teachers are not being communicated in a systematic way upwards to district level officials.

- Unsystematic stakeholder engagement

A critical factor in promoting the relevance of CEDP projects is arguably effective stakeholder management throughout the project. At 6 months, it appears that the process of engaging with District level officials in relevant sectors (health, education, social welfare) has been unsystematic. In some districts the PEA is aware and engaged in the projects, in the northern projects the district official is a ‘placeholder’ for DEC reporting. The question of coordination is raised in the analysis of value for money.

#### *How relevant was the approach taken by CES to community managed RET projects?*

CEDP was CES’s first implementation of renewable energy projects outside Scotland. CES adapted its project stages approach, designated for use with northern communities in Scotland<sup>6</sup> with support from the Development Officers. CES’s focus is on building community capacity and ownership of any eventual RET installation. The principal of community management is in this sense well-aligned to current practices in community development. The approach taken concentrated on the following stages and key activities:

4 Indicators in the DEP have remained stable over recent years and therefore in zones where CEDP have implemented several primary school solar projects, it may be possible to see a contribution to the zone level indicator.

5 Please note in the case of Nkotakota’s DEP this indicator was a priority under Access and Equity

6 <http://www.communityenergyscotland.org.uk/what-we-do.asp>

1. **Pre-project development:** Building relationships at District level, workshop with DEC and meeting with District Environmental sub-committee and social affairs
2. **Sensitisation:** CBO selection, Needs Assessment, baseline Energy Audit, training on RETs, elect Energy Committee, Learning journeys
3. **Pre-Installation:** capacity building of energy committee, build community ownership, business plan, application process for grant funding
4. **Project implementation:** system installation, community training (system use, maintenance, finances, and reporting)
5. **Maintenance and Project aftercare:** reporting, case study, project evaluation.

All project proposals were submitted to the District Executive Committee for approval. The DEC approved all projects in all districts. At this point, a sector head was designated to work with the projects. All MREAP projects fell under the Environmental sector. A focal point for all CEDP projects was then chosen in community development and social welfare. This office was chosen because the hallmark of the CEDP approach was making the Community Based Organisations (CBO) grant recipients and therefore ultimately responsible for management of the project. CBOs in the Malawian context are historically responsible for providing local care for HIV/AIDs and are therefore synonymous with supporting the vulnerable and addressing community needs. Four CBOs were chosen<sup>7</sup> in each district and after an initial assessment; one CBO was selected<sup>8</sup> and approved by the DEC. Each CBO has a jurisdiction that may include many communities. In general a CBO covers 1 Group Village head. A group village head may have 6 to 7 villages under their responsibility.

The following additional key themes emerged from an analysis of the data.

- Importance of flexibility in project design – bottom up process from needs assessment

The ability to allow the project type to vary from community to community meant CEDP could be highly relevant to each community. While it was pre-determined that CEDP projects would incorporate RET(s) into them, the choice of technology and application was left completely to the DO to facilitate with the community. In both Balaka and Chitipa when water was the principal concern within the community after the needs assessment, the DOs proposed water solar pumps. In others the focus was on lighting, improving education and access to health care. In other development programmes, the project concept is chosen prior to community engagement.

- Strong commitment to the agency<sup>9</sup> of the community (and existing structures), transparency and principle of subsidiarity<sup>10</sup>

The approach resulted in strong relationships between the DOs and the relevant community and village level contacts and structures. These relationships benefited from the good character of the DOs but it was how the DOs facilitated the process at the community level that built a strong sense of ownership of the project and legitimacy of the energy committee. The DOs felt strongly that the engagement of local chiefs was critical to their successful mobilisation for the projects (a key recommendation of the 2012 MREAP Evaluation). Several village heads linked improved

<sup>7</sup> Please Annex 15 for a sample CBO appraisal. Each appraisal considered and rated 10 factors. The CBO was then given a traffic light and a recommendation in terms of whether they should proceed for CEDP funding, keep in touch or are ineligible at this time.

<sup>8</sup> Guidelines for CBO selection were agreed and included the need for representation of vulnerable and excluded groups such as youth, elderly, female headed households, and disabled people. Please see Annex 11.

<sup>9</sup> The use of the term agency here refers to the capacity of the community to act independently and to make their own free choices as opposed to the term 'structure' which suggests a pattern of pre-existing arrangements that influence and / or limit opportunities and choices. Bourdieu's (please see [http://en.wikipedia.org/wiki/Pierre\\_Bourdieu](http://en.wikipedia.org/wiki/Pierre_Bourdieu) accessed 25th February 2015) key concepts of habitus, field and capital are central to this understanding and it would be interesting to consider the inter-play of these concepts in the decentralised context of community managed RETs where there is no official decentralised responsibility for RE at the district level and how different forms of capital (economic, symbolic, cultural and social) are built.

<sup>10</sup> In its most basic formulation, it holds that social problems should be dealt with at the most immediate (or local) level consistent with their solution (<http://en.wikipedia.org/wiki/Subsidiarity> accessed 25th February 2015)

communication (through more accessible mobile phone charging) to community development and greater community wellbeing.

Building on the existing CBO structure was an appropriate method of community engagement because the CBO is based in the centre of the community. It is always there and therefore in many ways can carry the voice of the local people in its representation. Through using this structure there are many associated community, society and district benefits.

- Management tensions between CBOs and other key stakeholders

On occasions there were tensions between District level officials and CBOs as well as between CBOs and EMCs. One set of district level officials expressed concern that there were no allowances (monetary) for the district officials to monitor and supervise the works or support the CBO throughout the project. For the EMCs, at times it was felt that there was too much management oversight by the CBO. It could be argued that these emerging conflicts could have an impact on longer term sustainability of projects.

The training<sup>11</sup> on group dynamics given by local community development officials encouraged committee members to ask the chair or treasurer what was happening – every member should know what is happening, then they too can report back into their respective structures in the community.

### *3. How appropriate was the capacity building approach at the CBO and individual project level?*

As stated previously, CEDP was CES's first implementation of renewable energy projects outside Scotland. CES adapted its project stages approach, designated for use with northern communities in Scotland<sup>12</sup> with support from the DO. In general, MREAP as an action research grant, assumed a low level of local knowledge around modern energy services and their appropriateness to local community needs. Therefore it was expected that CEDP would spend a lot of time building local capacity. In the end, to counteract this low capacity and also because of other external factors (please see Figure 1 on page 3 for a summary), CEDP spent 2 years dedicated to Stages 1 to 3.

During this time, it is understood that once an Energy Management Committee (EMC) had been elected a skills audit was carried out of the CBO and the committee itself. The purpose was to provide tailored support to the CBO and committee. Then each DO arranged for the Energy Committee to go on a learning journey. Once this was completed each CBO<sup>13</sup> received the following capacity building from their DO:

- CBO Management training targeting CBO members.
- Renewable Energy technologies training targeting mostly the energy committee and the CBO.
- Business Management Training targeting the Energy Committee and CBO
- Business Plan development and completion (done after mgt training)
- Group dynamics by community development officers. This focused on how to conduct themselves, how to take office bearers to task, issues of accountability and responsibility.

The key finding from a review of documentation, key informant interviews and focus groups discussions is however that there were three major risks associated with CES' approach that had to be mitigated. Firstly, CES' inexperience in planning and managing in a development context arguably led

<sup>11</sup> Unfortunately, no further information was received on the training to include it here.

<sup>12</sup> <http://www.communityenergyscotland.org.uk/what-we-do.asp>

<sup>13</sup> It has not been possible to verify exactly what training happened when and to whom. It would be important to do so before commencing on additional training.

to too many sites being chosen without any<sup>14</sup> planning and/or management of the amount of total effort that would be required to work over the large geographical area for the budget and time available. The result for CES was much higher support costs than anticipated. These unanticipated costs were borne by CES solely.

The second risk was at the project level. Arguably, a lack of planning and management could contribute to a reduction in the sustainability of project outputs and achievement of project outcomes. More time will need to pass before it is clear whether or not this is the case. However, it is the case that Development Officers were not able to spend as much time as required with communities because they were travelling so often between sites.

The final risk was internally to MREAP from CEDP that the DOs and CES would not have the necessary time to dedicate to monitoring and supporting the roll out of tools associated with collecting and storing data. This was also the case and resulted in additional time being spent by IOD PARC and Strathclyde University to ensure data was collected and stored.

### *Additional findings*

The following additional findings emerged from a review of documentation and primary data gathered from interviews and FGDs.

- Too early to judge appropriateness at project level

There is limited evidence available which specifies exactly what training was conducted, where and with whom. There is also no update on CBO/project level capacity since the training.

- CBOs played a legitimate role however concerns remain over capacity

The function of the CBO to disperse funds and be the conduit for the grant was a strategy that allowed CEDP to have one consistent model of partnership across its portfolio. It appears from interviews that the business management training did build capacity and understanding however the issue of low capacity remains. At this stage it is unclear as to whether the CBO capacity is sufficient to manage the funds required to operate and maintain the systems because there is no absolute record of the amount of training each CBO received and over what period. A more detailed study focusing solely on CBO management capacity could be carried out immediately post MREAP. Such a study would work from the baseline skills audit, establish the training that took place, review the O&M of the funds and conduct a fresh needs assessment.

- Highlight of capacity building process was the use of learning journeys

Members from the energy committee, CBO and in some cases teachers (if the installation was going ahead at a school) would visit a pre-existing installation and meet with the community and learn from their experience. In the majority of cases, the learning journeys visited solar PV projects that were not longer functioning. So, the CEDP stakeholders had a great opportunity to understand where the teachers and energy committee members felt they went wrong, what had worked well and what didn't. This peer to peer learning was very effective in building confidence that the community would be able to learn from the mistakes of others to manage the RET.

- Modest influence on Primary Education Advisers

CEDP has modestly and indirectly through its District presence and process contributed to the growing demand for access to modern energy services in schools. In Nsanje District, there are current movements to prioritise the use of solar PV for lighting in primary schools across the district through

<sup>14</sup> Development Officers planned their work and submitted these workplans to CES. However, no documented evidence was found during the process evaluation for the total national plan being reconciled against actual budget/time available.



a revised District Development Plan<sup>15</sup>. In addition to this Nsanje District Development Officers confirmed to the Evaluator that the Local Development Fund (LDF) is being used to ensure that all new teachers' houses are being fitted with solar PV. It is not possible to demonstrate CEDP's contribution to this decision however it is reasonable to assume that CEDP has contributed, in smaller districts such as Likoma, to the overall momentum influencing the decision. In short, the PEAs saw the benefits in terms of teacher retention linked to provision of modern energy services e.g. lighting and communication services.

In Likoma the traditional chief intimated that he expects to see energy in the next District Development Plan and that there could be an energy committee at Area (Likoma) level in the near future. Again before CEDP the discussion focused on ESCOM and grid extension, but *“after this project, demand is so huge, it has become the talk of the island.”* The District Commissioner would like to put solar in all households. The DEM and PEA have agreed that they will expand solar to Chizumulu. Yofu School Management Committee chair said that

*“Since the installation of solar, there are sometimes specifically meetings about solar. There is a change; people are now discussing more about energy. People are also discussing wind energy. Everyone would like energy to be provided across the village. It’s not in the current **Village Development Plan**, but hoping for it to be in the next one – that will be the first time.”*

### Conclusion

At 6 months, an analysis of evidence suggests the CEDP projects have contributed to an improvement in quality and relevance of education and that over time this could lead to improvement in zonal level results. However, it appears that the process of engaging with District level officials in relevant sectors (health, education, social welfare) has been unsystematic. Where PEAs have been engaged there has been a modest amount of influence on them that has supported an increased awareness in the benefits of energy. An analysis of DEPs provided evidence that CEDP projects are targeting the most vulnerable and underperforming schools.

It has been found that lighting in schools contributes to improvements in teacher wellbeing as set out in the Teacher Retention Survey and Impact Report. Teachers consistently reported being happier to stay at the school they were deployed to because of the lighting and improved communications (charging of mobile phones locally).

The capacity building approach focused on building business skills. It was ambitious given the low capacity of the CBOs and the levels of illiteracy. The CBOs did however play a legitimate and consistent role in building a strong sense of community ownership across the projects visited. Arguably however a less diverse portfolio would have freed up more time for increased community support and training.

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<sup>15</sup> Evaluator tried to get access to this plan but it was not possible. However all attendees of the focus group corroborated the existence of the plan and its revision to include solar PV in primary schools.

## Results

A short section on results has been included, prior to effectiveness, to highlight the results of the programme (e.g. how many projects have been implemented) as well as what changes have been evidenced (e.g. changes in livelihoods and welfare) at 6 months. A logframe for MREAP was developed in 2014 and will be reported on separately by the University of Strathclyde in the final MREAP report. This section begins with a discussion of the contextual constraints and the CEDP portfolio before reporting the M&L Framework results.



### *Methodological Challenges*

In a short programme like MREAP (3 years long), the time dedicated to community facilitation means that there is limited ability to provide data through monitoring and reporting on the subsequent livelihood and/or welfare gains.

In addition, CEDP was a community based piece of work and was not designed to carry out a formal baseline. However in early 2013 a series of needs assessments were carried out in targeted communities. Please see annex 12 for a sample needs assessment. The objectives of each assessment were to:

- Collect information about participants' background in and their current roles and responsibilities within their respective agencies;
  - Identify challenges or problems which the people around 'sample' CBO face in terms of energy;
  - Identify knowledge gaps in renewable energy technologies in the community;
- Identify potential stakeholders or partners in renewable energy projects in the community;
  - Assess factors that would influence willingness to actively participate in the energy projects, and determine interest in assuming a leadership role or other responsibilities; and,
  - Assess preferences for format and frequency of periodic meetings and on-going collaboration.

The process was designed as a community vision workshop. In a vision workshop, the aim is to have a general idea of how different groups of people in the community prioritise development in their community. Communities were asked to prioritise problems in their communities and propose solutions. From this, the DO worked with the communities to choose the most appropriate application of RETs.

ISP and RECBP worked closely with the DOs to develop a M&L database (based on the indicators) that would allow CEDP to track the changes in their projects. This included setting a baseline against each of the indicators. Please refer back to the timeline on page 3, which clearly sets out the sequencing of M&L activities.

This results section will consider the data that is available in relation to the results of the CEDP process with communities which has led to the installation of 46 systems over a diverse area (see map

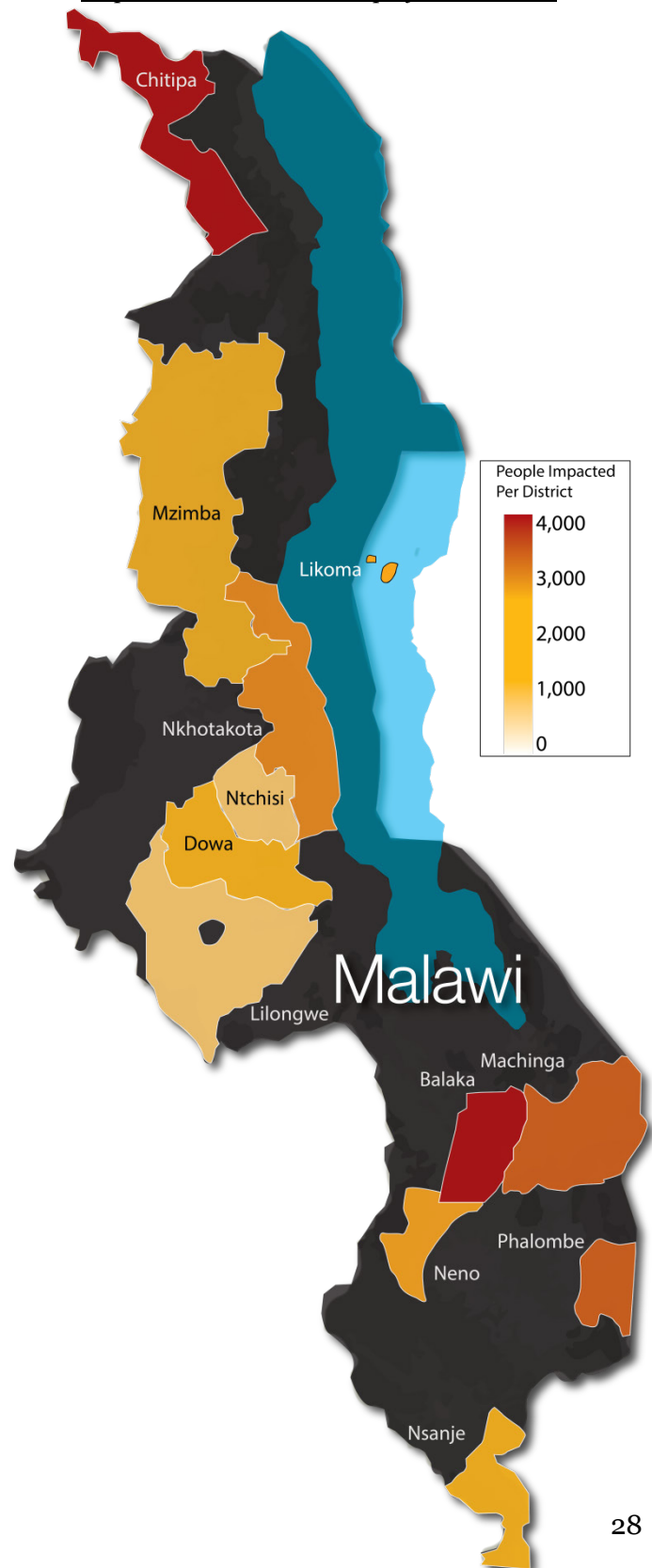
1 on the following page and table 6 for details as well as Annex 9). The evidence presented is taken from internal monitoring and is supplemented by work undertaken for this process evaluation and the teacher retention survey (September 2014). Techniques used for evidence gathering include: FGDs, beneficiary/key informant interviews and regional monitoring reports. These results therefore relate to the short term gains and people’s expectations of benefits which could be followed up later by an impact and sustainability (of installation) analysis in 3 years’ time. At that point, assuming systems are still functioning, more detailed benefits (hopefully) will be clear to see, and if systems are not functioning e.g. through lack of money for repair, understanding of why technical or group maintenance activities, were not strong enough to deal with these issues would be of interest.

- A diverse (geographically & technically) portfolio of projects

To assess the effectiveness of CEDP interventions it is important to understand how the CEDP portfolio was developed and therefore what the data can and can’t tell us. The process followed a largely ‘bottom-up’ trajectory, in which community-based organisation (CBOs) were given near-complete autonomy with regards to project design. The end result of this process was a very diverse portfolio of projects deployed nationally (see table 6 and annex 9). Rather than focusing on a limited number of sites in selected districts, the DOs sought to enhance inclusiveness by distributing interventions across as many locations in as many districts as possible. For an action research / proof of concept programme like MREAP CES had to actively balance the needs of testing the concept with inclusion. There was a clear process for selection of sites, design of RETs for sites but no explicit process to manage the number, location and type of projects as a CEDP portfolio.

The Northern DO managed a portfolio of 23 projects across 4 districts: the most northern Chitipa, Mzimba, Nkhotakota and the island of Likoma. The Central DO managed 11 projects across 4 districts of: Lilongwe, Ntchisi, Dowa and Balaka. The Southern DO managed 12 projects: from the most eastern districts of Machinga and Phalombe, then Neno to the southern tip of Malawi – Nsanje District. Including the individual solar panels on the teachers’ houses the total number of systems installed to: N- 52, C- 18 and S-26.

Map 1: Distribution of CEDP projects in Malawi





## Project Level Results by Indicator

This section presents results registered in the first 6 months of the M&L framework. Please refer back to the methodology section for the history of indicator development and the timeline on page 3 for when the final set of indicators and the M&L database were finalised. Given the diversity of community systems and the very limited level of engagement with modern energy services which MREAP was designed to help remedy, for these agreed indicators, unless otherwise specified, the baseline would have been zero or close to zero. This can be further argued because the majority of the sites (please see map 1) were geographically remote and chosen precisely because they lacked access to electricity and energy efficient services. Where possible, data from the original needs assessments has been included<sup>1</sup>.

### *Cross-Cutting issues - Reaching vulnerable and excluded groups*

MREAP validated the statement on working with vulnerable and excluded groups in an early Programme Steering Group (PSG) meeting. The solar lantern projects and cookstove projects reached very poor rural communities. Schools were selected, in the main, from the remotest and most disadvantaged areas. From an analysis of the District Education Plans for 3 districts it is evident that, CEDP projects could in the medium term contribute to zonal level changes against the second thematic area of NESP is access and equity in terms of:

- Overall enrolment rates (an increase) and signs of increased enrolment in girls: this will be through an increased acceptance of the importance of education for girls. In Nsanje before electricity the female learners were not allowed to come and read at night. Before they were buying torches and paraffin – only male students were allowed to come and read. Now with solar PV and a security guard, the situation has improved and female students can come at night.
- Increased access of girls to boarding which in turn improves their educational opportunities. Consistently across all projects evaluated there is evidence of a movement towards boarding at schools with increased access to lighting. In general it can be said that the boys have access first. However it has been noted in Machinga that the community is currently involved in discussions to open up boarding to girls. It is important to note that there have been no issues raised in relation to security for girls' e.g. safe boarding and unplanned pregnancies.
- Increased access to education for orphans on Likoma Island as they are able to attend evening classes and are not expected to pay for electricity.
- Increased access to education for disadvantaged girls at Bwangu Primary School in Nsanje. Prior to installation girls were not allowed to study at night at the school. The SMC sat down with the EMC to propose a payment plan for these households to also buy solar lanterns for those with girls in senior classes.

### *Indicator AA: Percentage increase in access to energy for community schools across district*

The CEPD portfolio is made up of 46 projects across 12 CBOs located in 12 districts across all regions of Malawi. The projects have targeted a range of beneficiaries including: pupils (primary and secondary), teachers (secondary, primary and those who train at TDCs), teacher's households, customers (of CBOs who bought solar lanterns) and mothers (health clinic). While this indicator was chosen to report specifically against school access, it is important to also include a discussion on other projects that 'increased access' such as the health clinic and solar lanterns. It was not possible to formally count the total number of beneficiaries from the water projects; however it is important to

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<sup>1</sup> At the time of writing this report the needs assessments had not been published.

include these projects to give an accurate portrayal of the total CEDP portfolio. For CEDP, household access could only be counted when a solar PV system had been installed in a teacher’s home. Table 7 below details the total number by type and gender.

**Table 7: Total number of beneficiaries by type and gender (where possible)**

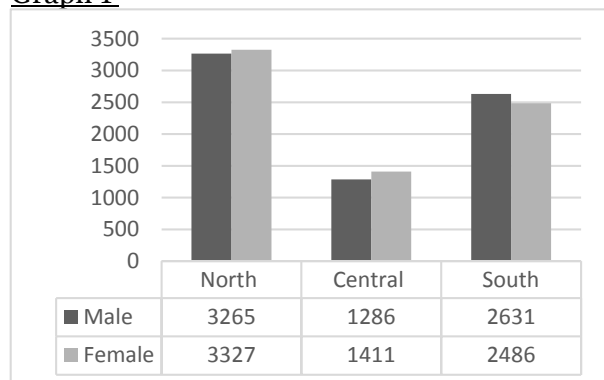
Beneficiary Type	Type of Benefit	Estimated People		
		Gender		
		Unspecified	Male	Female
Students	Lighting in classrooms (Tier 2)		7,242	7,260
Teaching Staff	Lighting in classrooms (Tier 2)		180	42
Teachers Households	Lighting systems at home (Tier 2)	266		
Employees	Employed in Revenue Generating Activities		11	1
Customers	Receiving Energy Services		487	448
Households	Improved cooking services	1650		
Households	Lighting system at home (Tier 1)	2474		
Mothers	Giving birth at health centres with Power (Tier 2)			378
subtotal by gender		4390	7,920	8,129
Total		20,439		

The **total number of beneficiaries** of CEDP projects under MREAP is 20,439. National statistics indicate that less than 1% of Malawi’s entire rural population had access to electricity services as of 2010. 80% of Malawi’s population lives in rural areas and in 2010 the rural population was estimated to be just below 12 million people<sup>2</sup>.

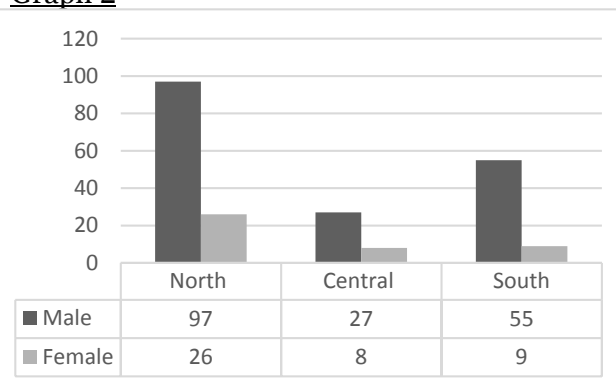
Students and teaching staff comprise 72% or 14,724 of the total beneficiaries, by far the largest group of beneficiaries<sup>3</sup>. The greatest number of teacher and learner beneficiaries is located in the Northern and Southern Regions, which reflects the composition of their project portfolios. It also reflects the data that was possible to collect. CBOs recorded the sales of solar lanterns. Cookstove production groups also recorded the successful sales however CEDP did not monitor beyond the number of sales to the number of household beneficiaries. MREAP used data from the Teacher Retention Survey, validated by Concern Universal (a Strategic Energy Partner), to make the assumption that 5.3 individuals (not disaggregated) are found in any one household<sup>4</sup>. From this assumption it is possible to arrive at a number of beneficiaries (as expressed in table 1) for: households (tier 1 lighting), households (improved cooking services) and finally teaching households represent 1%, 8% and 12% respectively of the total number of beneficiaries.

The following graphs disaggregate: 1) total number of learners; and 2) total number of teachers.

**Graph 1**



**Graph 2**



<sup>2</sup> Rural Poverty Portal, Malawi, IFAD accessed March 2015

<sup>3</sup> Data was gathered from District Education Managers as well as Headmasters and is fully verifiable

CEDP delivered both access to modern energy services (90 in total) to institutions (40) and households (50) as well as improved energy efficiency (4) and improved access to water (2). Please refer back to table 6 for a full breakdown.

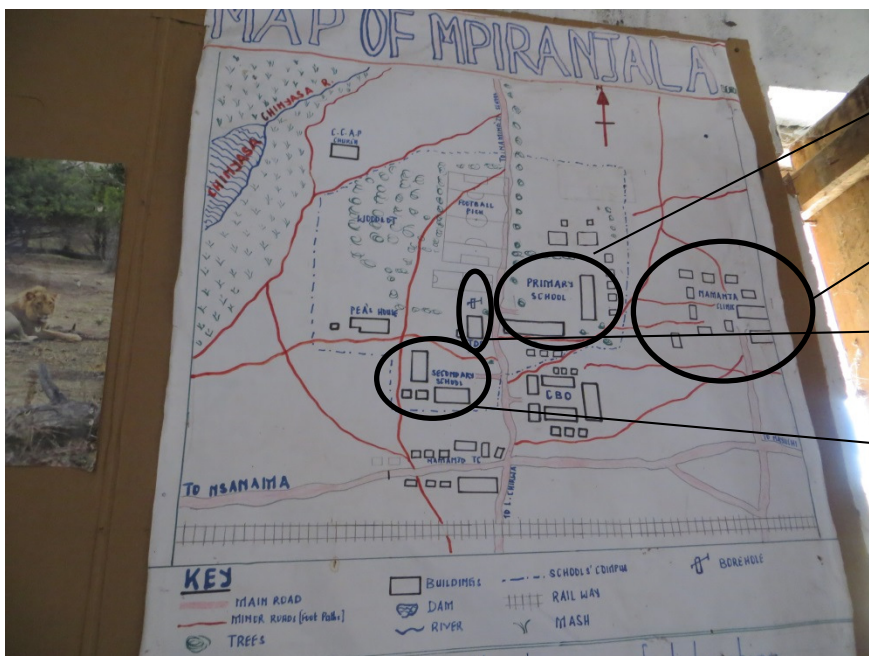
*Health Clinic*

A total of 378 healthy babies were born at the single health clinic monitored by CEDP. The Health Manager was interviewed for the evaluation. In his opinion the lighting has resulted in an improvement in working conditions and access to improved communications (through mobile phone charging) that mean he and his nursing team are more able to discharge their duties. He stated that he would remain in post now as would his senior nurse. A small write up on the health clinic can be found on page 38.



*The photo was taken of the solar panel on the roof of the delivery suite at the Namanja Health Clinic.*

*A map of Mpiranjala is below. The map shows the cluster of CEDP installations in this community including the health clinic.*



- Primary School
- Health Clinic
- Teacher Development Centre
- Secondary School



### Solar Water Pumps

2 water projects were included in the CEDP portfolio: Northern district of Chitipa and Central district of Balaka. The project in Balaka was visited as part of the evaluation. While it was not possible to verify the total number of people who benefited from this 1 project, the traditional leader estimates that 168 households in Lijera village and 900 learners at Mikwala Primary School now have water closer to their homes which reduces time to collect water. These figures are not included in the total number of CEDP beneficiaries because there is no baseline from which to judge improvement. The photos below are of the Solar PV water pumping system installed at Mpiniumodzi Primary school in Balaka district. In first left hand photo note each tank is 5000 litres (volume); 4 kiosks (middle and right photo below): 3 installed in Lijera village at a radius of 500 metres serves the community, and 1 kiosk is installed at the school to serve the learners.



### Cookstoves

4 cookstove projects were set up by CEDP: 2 in the North and 2 in the Central region. CEDP have modestly supported the country's push for improved cookstoves nationwide by setting up producer groups and selling 325 cookstoves in the first 6 months.



*Photo far left is of the cookstove shelter in Mzimba, near left is of the cookstoves. Below is the cookstove kiln where the newly made clay stoves are fired.*





Lipenga and Mnziona CBOs successfully adopted a Village Savings and Loans (VSL) business model. As a result there has been economic empowerment of women through the interrelationship between stoves projects and VSL bank. In Dowa, 80% of VSL members are women.

### Lanterns

A total of 9 solar lantern social enterprises were set up by CBOs that sold a total of 465 lanterns. The breakdown of these is: 1 in the North, 4 in the Centre and 4 in the South. Lantern users were met in the North and South evaluation visits. Household savings were being made once the initial outlay for the solar lantern had been recouped because there was no longer any need to buy batteries for torches or candles.



*Photo on left is of solar lantern working in a home. The photo below is a smaller lantern used for studying in Machinga.*



## Summary

In summary, the results registered so far against this indicator suggest that the CEDP portfolio has made a contribution to increasing energy access in off grid rural settings in primary schools. Finally, the positive trend of solar lantern sales is evidence of the immediate success of the CBO business planning. This is followed up further in the discussion of results of indicator FF – funds for operations and maintenance.

### *Indicator BB: School population figures and entrance rates for primary school leavers*

Rural schools were identified by the community beneficiaries (as represented by CBOs) of the programme as the preferred choice for a solar PV system. Largely this was because of the importance of education and the need to increase access to lighting.

The programme’s assumption is that the provision of modern energy services to schools in rural communities has an advantageous effect on students’ educational attainment, as well as teacher retention. It was predicted<sup>1</sup> that these benefits would manifest themselves through higher enrolment rates and reduced failure rates in the exams required to progress from primary to secondary school. Data gathered against this indicator serves to test this assumption and is presented below.

### *Pupil Enrolment*

The data gathered up to the 6 month point serves as a reliable record of pupil enrolment and achievement in the short term since installation. In reality, however it is too early to tell whether or not the installations have had the anticipated impact on student performance and teacher retention. Any positive (or negative) impact is likely to become more apparent in another 6 months’ time (and then annually from thereon) when the results of July 2015 exams are available.

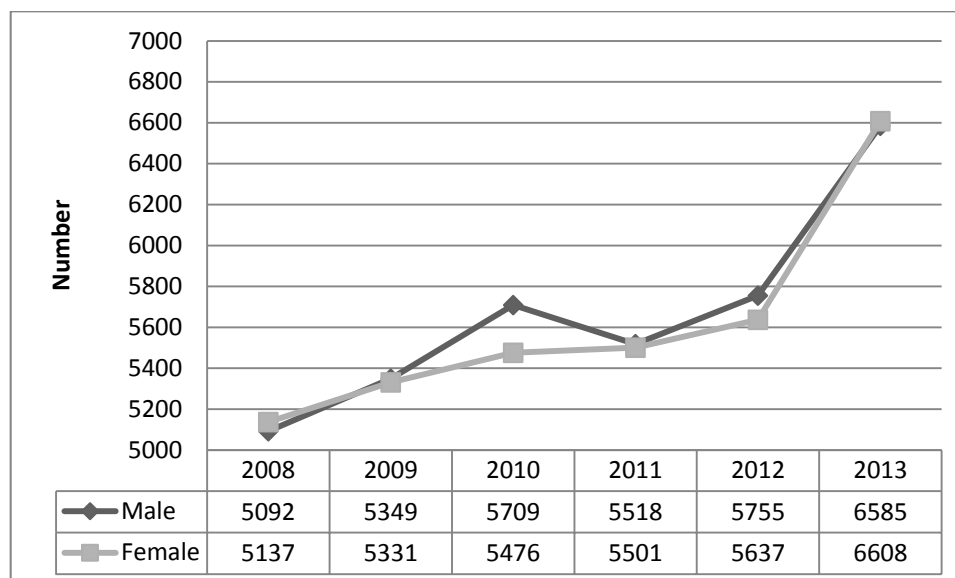
While it was possible to gather historical data from 2008 onwards in order to present a robust picture of the case prior to installation again, more data is required for 2015 to complete the picture. Graph 3 below demonstrates that across CEDP schools, there has been a gradual and steady increase in the number of students attending the schools over the past seven years. Graph 3 then shows that this is experienced by both male and female students. There has been a 36% increase in student population since 2008. To test whether there was a ‘solar PV effect’ on the numbers (ie that an increase in enrolment precedes solar PV installation), it is reasonable to assume that this would demonstrate as a % increase from when CBOs were selected (Feb 2013). Between 2013 and 2014 there was a rise of 7% in male enrolment and 4% in female enrolment. However the graph below suggests that there was a more pronounced incline (22% increase) around 2012. Presently it is unclear what factor was a work across the primary schools.

**Graph 3: School Population 2008 – 2014**



<sup>1</sup> There is no counterfactual in place for CEDP projects. However, where possible other actors and factors involved at the project level were kept track of. For example, school feeding programmes were noted as were sanitation conditions at each school. The understanding is that these factors also play a crucial role in increasing educational attainment.

Graph 4: School population by gender in targeted schools: 2008-2014



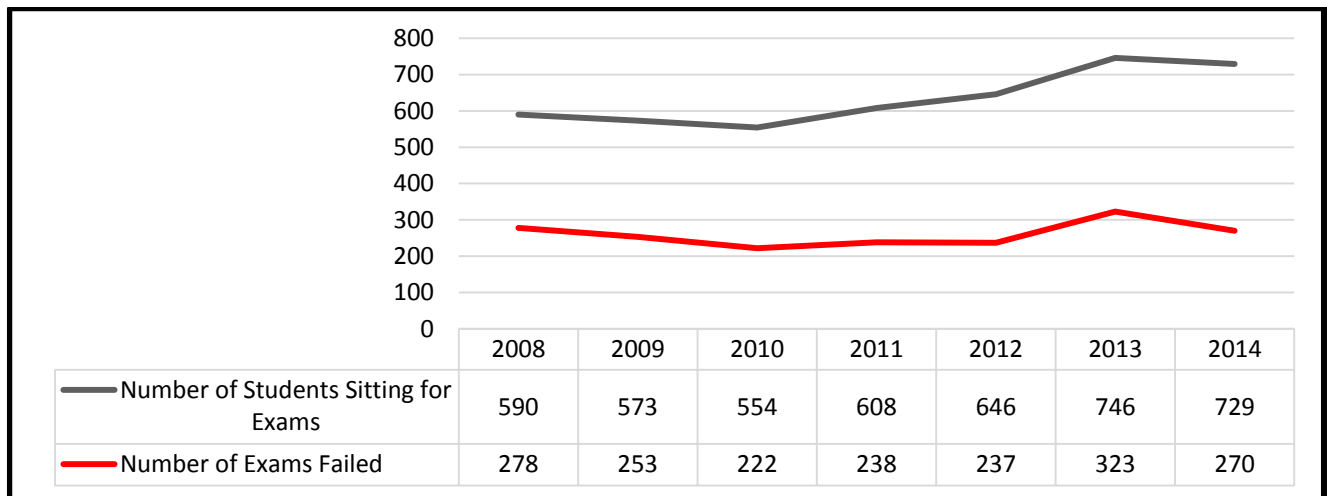
### *Exam Performance*

In order to progress from primary school to secondary school, students are required to sit and pass the Primary School Leaving Certificate (PSLC). A very small percentage of pupils sit the PSLC because of the very challenging environment for gaining a quality primary school education. In general, schools in Malawi are under-resourced, under-financed and under-staffed. There is a shortage of qualified teachers in rural areas and a national shortage of classrooms. These make for very challenging conditions for pupils to learn in and for teachers to teach in.

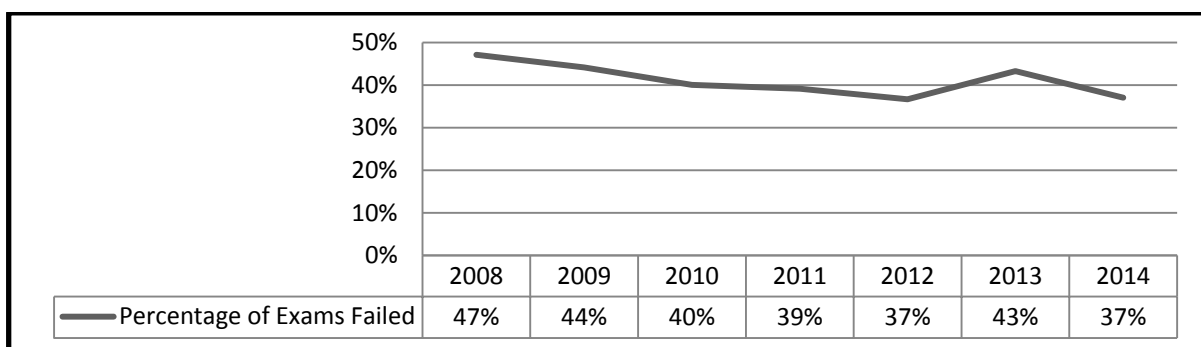
The number passing the PSLC was chosen because it is already collected at the district level and would not create a burden for local communities. Data collated against this indicator demonstrates a very high rate of exam failure among pupils in the schools targeted under the CEDP. Unfortunately, as already expressed, this is a national problem within Malawi due to the challenging environment.

The programme's assumption was that improved access to lighting would enable additional hours of learning, study, better teacher motivation, efficiency and an overall improvement in educational attainment. For this reason, data was also collected for the period 2008 – 2014.

Graph 5: Total number of exams sat vs. total number failed: 2008-2014



Graph 6: Exam failure rated in targeted schools across all regions: 2008-2014



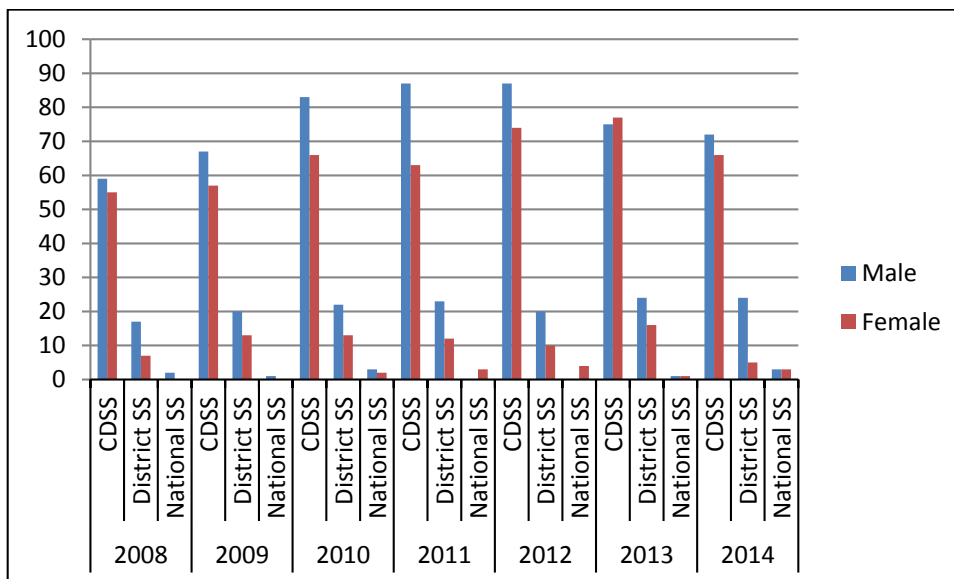
**The overall trend is that exam performance is very gradually improving in CEDP-targeted schools.** Since 2010 there has been an increase year on year in the number of students sitting the PCLE (from 554 to 729 in 2014), which represents 23% increase on the initial figure (590) collected in 2008. While this increase is neither indicative of an improvement in quality of education nor of a contribution of solar lighting (at this early stage), it is encouraging that the overall trend is improving across all regions.

Furthermore, the evidence collected from the Teacher Retention Survey and field trip to CEDP schools in Chitipa illustrates that **access to lighting does make a difference to the quality of education.** One headmaster in Chitipa district reported during interviews that that “twenty students have been selected this year for secondary school and we attribute this to solar. Before it was usually two to five students who went to secondary school.” It is clear that CEDP is well placed to **accelerate** this improvement.

Graph 7 below demonstrates where the successful candidates are going. CDSS or community day secondary schools are the most accessible for primary school children; national secondary schools have stricter entry requirements. Therefore an increase in time and in access to national schools would be a further indication that educational attainment was improving.



**Graph 7: Total number of CEDP target learners achieving secondary school entrance (disaggregated by gender)**



**Photos: Solar PV installed at school blocks at Nkasi Primary School**



*Indicator CC: Number of Safe and Healthy Births<sup>2</sup>*

**A total of 378 healthy babies have been delivered at Namanja Health Clinic in Machinga District since the installation of solar PV on the delivery suite.** Data gathered from the Health Manager suggests that the provision of lighting to the Maternity wing has had a positive impact<sup>3</sup> on the number of safe and healthy births occurring at the clinic. During March, April and May 2014 a total of 154 babies were born. Between June, July and August a further 50 babies were born, or an increment of 33.3% on the last 3 months. The final reported period between September, October and November reported a further increment of 174 births or an increase on the previous period of 85%.

<sup>2</sup> Only 1 of the 46 projects in the CEDP portfolio targeted a rural health clinic.

<sup>3</sup> There is no counterfactual available to demonstrate this impact and it was not possible to validate the data at the District Office. These results may have been caused by any number of factors, including increased staff capacity, increased awareness of the availability of health services amongst the general population, or even improved access to the clinic by virtue of new infrastructure. However the dramatic rise in the number of births and the testament of the Doctor and Nurse to the situation are considered to be valid and professional evidence in the absence of other District level data.

When interviewing the Health Manager of the Clinic it was found that there have been other benefits to the patients and staff. Staff are now able to charge their phones and therefore have a more reliable means by which to call ambulances when necessary. Furthermore, the improved lighting source has improved the wellbeing of staff at the clinic. An employee of the clinic experiences problems with his eyes and cannot suture by candle light. He would routinely need to call the Doctor to perform this task during the night. Now he is able to fully discharge his duties. While it is a sole case, it could be expected that the installation of solar panels on Namanjana Health Clinic has also modestly assisted the District to improve its health outcomes. A short write up of the case of the Health Clinic can be found below.

### Namanja Health Clinic Case Study

Lighting at Namanja health clinic has benefited patients greatly. “Patients usually used candles however most patients are poor and can’t manage to buy one, so solar has been a huge relief. Using a candle during the night is very difficult” said the Health Centre Manager.

The lighting has also improved the working conditions for the staff (of whom there are 21). Those who reside around the clinic total 9 and are now able to work day and night. A great illustration of the difference the lighting has made to one member of staff. A Nurse who has problems with his eyes has had to call the Doctor to suture at night. However now with the lights he can do it by himself at night.

The Doctor reports that maternity data has also improved since the installation. “Some people were scared to come without a candle – they would be chased back – an employee can’t always buy a candle for them. On average the clinic receives 10 candles a month from the government.” He said that historically he would spend K5000m per month on candles at home and at work. Now he saves this money. He is very proud of the solar.

It is difficult to state accurately what the increase in usage is of the health facility but the Doctor states that 50/60 live births per month were normal before solar and now they have more than 100 a month. “Of course it varies depending on the period, for example now the Health Centre is isolated because of the flooding but before people were coming from afar and general enquiries are up by 30%.”

In addition, the staff can now charge phones and are able to call ambulances much more easily. Before, they would have to find someone with a charged mobile or travel to the nearest Trading Centre to call an ambulance.

While it is not possible to attribute the dramatic increase in the number of births to CEDP alone, arguably the supplementary evidence gathered during the field visits (as discussed above) points to the benefits of lighting for healthcare and safer delivery of babies.

*Indicator DD: Increase in the number of male and female headed households in targeted areas with access to electricity<sup>4</sup>*

The original purpose of this indicator was to collect data to feed into the general reporting at district level on access to energy. For CEDP, the projects relevant to this indicator were those where solar PV was installed on teachers’ homes.

A total of 50 installations have taken place across the targeted areas. It is known that one of these houses had access to grid power but that the owner could not afford to pay for the electricity. It is therefore reasonable to assume that **CEDP improved access to energy for 49 households**. The

<sup>4</sup> As set out in the methodology section it was not possible to count the total number of beneficiaries from solar lanterns, only the number of units sold as per indicator EE.

disaggregation of the data by gender validates the evidence<sup>5</sup> that the majority of teachers in rural settings in Malawi are male. The 4 female teacher headed households were in the North with 24 male headed households. In the centre there were 7 male teachers' homes and double that in the south (14 houses).

In a total of 47 out of 50 houses teachers were paying for their electricity. In the North this payment was a standard K1,500, in the centre it was K300 or K500, then in the South it was K1000. In the North the payments went to the EMC who deposited them in the CBO account for the purpose of O&M. In the Centre, the payments were made as part of a VSL and in the South the payments were also made to the EMC for the CBO to manage. It is not clear how frequently the payments were made and no further evidence was collected on the current status of payments by CBO. As discussed later in the efficiency section, this is an area that needs attention.

#### *Indicator EE: Number of units sold in targeted areas*

The M&L Framework counted the number of solar lanterns and cookstoves that were sold. Unfortunately, CBOs did not have the systems in place to monitor household level changes once solar lanterns and/or cookstoves were being used. However, as explained in the effectiveness section, it is reasonable to assume based on national benchmarks (the National Cookstove Campaign in Malawi) that there are: health gains – inhaling less toxic smoke particles reduces the likelihood of smoke-related diseases; livelihood gains – time originally spent collecting firewood can be spent on other activities; deforestation – efficient burning means less demand for firewood and in turn an impact on local forestry.

- Solar lanterns

A total of 465 solar lanterns were sold by 6 months; broken down into North 93, Centre 132 and South 240. Of the units which have been sold, a total of 14 failed, of which 12 were replaced under warranty. This represents a 3% failure rate. The evidence of replacement parts and the support of the DOs to the communities to understand warranties and get contractors to fulfil their commitments is discussed further in the section on sustainability.

- Cookstoves

A total of 325 units were sold by 6 months: broken down between the North 33 and the Centre 292. Of these a total of 37 units failed, of which 21 were replaced under warranty. This represents a 11% failure rate.

#### *Indicator FF: Percentage growth in funds for operations and maintenance*

One method of measuring the sustainability of technology transfer projects is through the establishment and then the growth of an operations and maintenance fund. All 12 CBOs have a dedicated account to manage funds for operations and maintenance. Community level training focused on building understanding in managing income, savings and maintaining their systems. Each CBO business plan details the income generation activities expected to sustain the system. Please see Annex 13 for an example business plan.

At 6 months, every CBO fund balance has grown through income generation activities. The range of growth is from K11, 000 to K1, 474,000. To give an idea of scale: a lightbulb costs K9500, an inverter costs K75,000 to K165,000, charge controllers cost from K66,000 to K100,000, a 85w solar panel costs K90,000, a 100w panel costs K125,000 and batteries cost between K85,000 to K110,000 .

#### *Indicator GG: Energy expenditure at the household level over time*

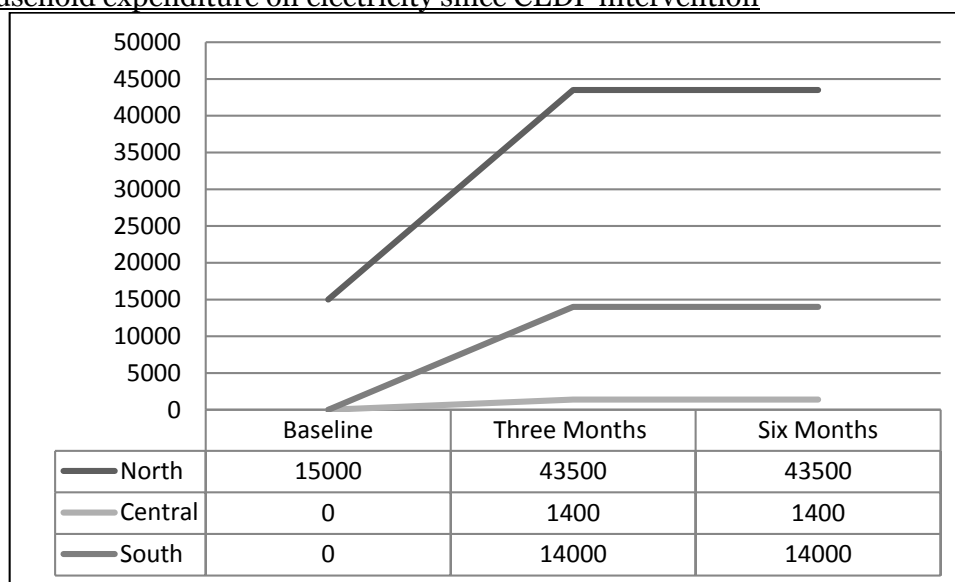
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This indicator measures the amount of money spent by households on ‘energy’ over time. This is broken down into several different types of energy, including wood fuel, charcoal, kerosene, dry-cell batteries and electricity. It was anticipated that the CEDP interventions would provoke an increased expenditure on electricity, and a concomitant decreased expenditure on wood, charcoal etc. Such a transformation would have the contagion effect of delivering several environmental, health and gender benefits. The M&L framework also provided a means to measure the accumulation of assets at the household level, before and after the installation of RETs.

Unfortunately, the data gathered thus far under the M&L framework is not sufficient to conduct a thorough analysis. However it is possible to describe some general patterns.

- There has been increased expenditure on electricity fees
- There has been a reduction in spend on kerosene and dry cell batteries.

**Graph 8: Household expenditure on electricity since CEDP intervention**



There is also evidence from FGD and interviews that some beneficiaries of solar lanterns have been able to save money since investing in a lantern. A woman in Neno district bought a lantern<sup>6</sup> that can charge mobile phones. She is raising a minimum of 300MKW a day by charging people to charge their phones. She said that she saves 100MKW and uses 200MKW for household needs. In Machinga, a local beneficiary estimated that he has now saved 3000MKW from not buying candles and kerosene since buying two solar lanterns for his children to study with. He is considering buying another one.

The LivingWage report<sup>7</sup> from 2014 estimates that the living wage for rural Malawi is K1,531 per workday for permanent workers (e.g. a tea worker, tobacco worker). Only 6% of workers in rural Malawi are wage or salary workers. 76% are subsistence farmers, 10% are self-employed and 4% have a family business. In 2010, 72.2%<sup>8</sup> of the Malawian population lived below the poverty line of \$1.25 a day (PPP) or K553. It is therefore reasonable to conclude that the savings achieved through the solar lanterns represent an improvement in living standards for the households concerned.

### *Indicator HH: Capital expenditure on electrical items at the household level*

<sup>6</sup> In March 2015 a D. Light S2 cost K3,700, a Sunking Pro K16,500 and a Powapack costs K32,000.

<sup>7</sup> [http://www.fairtrade.net/fileadmin/user\\_upload/content/2009/resources/LivingWageReport\\_Malawi.pdf](http://www.fairtrade.net/fileadmin/user_upload/content/2009/resources/LivingWageReport_Malawi.pdf) accessed March 2015

<sup>8</sup> <http://data.worldbank.org/indicator/SI.POV.DDAY> accessed March 2015

The purpose of this indicator was to gather data on the accumulation of electrical assets by households that had benefited from CEDP and perform an analysis of the type and number of assets found by region and then at portfolio level.

Unfortunately, at the 6 months point it is only possible to report overall patterns visible in the portfolio due to the incomplete nature of the dataset. At 3 months households have been buying additional mobile phones and at 6 months, 3 households have bought DVD players. In addition, 1 household has bought 2 new televisions and 2 households have bought hair clippers by 6 month point.

The discussion of results now moves into the analysis of effectiveness.

## Effectiveness

The evaluation criterion of effectiveness assesses how far intended outcomes were achieved in relation to original targets set in a logical framework. It assumes that the programme has a useable baseline from which to gauge progress, that analysis can be conducted at the outcome level and that targets were set from which it is possible to make a judgement about progress. To begin this section sets out the CEDP related logical framework outcome and associated indicators. Then, building on the results presented in the preceding chapter, the following questions are addressed:

- a) To what extent are the off-grid energy management interventions<sup>1</sup> contributing to development outcomes?
- b) What are the most effective off-grid energy management projects overall? (Taking into account social, economic and developmental factors, in addition to technical performance)
- c) How effective was the use of Community Based Organisations to manage the interventions?

### *MREAP Logframe Reporting*

A logical framework was developed for MREAP in 2014. The evaluation team drew results against CEDP Project related outcomes only, as per the scope of this process evaluation. The remaining outcomes are reported on in the final MREAP report. As stated at the beginning of the results section, in a short programme like MREAP (3 years long), the time dedicated to community facilitation means that there is limited ability to provide data through monitoring and reporting on the subsequent livelihood and/or welfare gains.

*Please note that the CEDP outcome in the logframe is from the original application and is not the outcome that was agreed for the M&L Framework.*

- Outcome Indicators

The breakdown of the results is presented in Table 8 on the next page. In summary however CEDP has met both outcome indicators for year 3 by delivering,

- an increase in 12 CBO funds dedicated to O&M, with available funds in the range of K11, 000 to K1, 474,000<sup>2</sup>, which is hoped will lead to greater funds to cover lifecycle costs; and,
- an improvement in working conditions for 51 professional staff (50 teachers<sup>3</sup> and 1 health worker<sup>4</sup>) through the provision of lighting, validated by the Teacher Retention Survey and Impact Report that could lead to increased retention of staff.

- Output Indicators

At the output indicator level CEDP surpassed the first output indicator by implementing 46 projects (against a target of 44) across 3 districts. For the second output indicator it is possible to state that over 20,000 beneficiaries have been reached by year 4. And finally for output indicator 3, CEM is a registered and established operation. However it has not secured funding past end March 2015.

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<sup>1</sup> These interventions are understood to be the CEDP project results and the overall process of CBO development.

<sup>2</sup> To give an idea of scale consider that a lightbulb costs K9500, an inverter costs K75,000 to K165,000, charge controllers cost from K66,000 to K100,000, a 85w solar panel costs K90,000 and a 100w panel costs K125,000 and batteries cost between K85,000 to K110,000

<sup>3</sup> Only teachers who benefited from lighting at home and in school are counted here.

<sup>4</sup> The total number of professional workers at the health clinic was not measured by the M&L Framework.



Table 8: CEDP related results in MREAP logframe

OUTCOME (CEDP)	Outcome Indicator 1		Baseline	PY1	PY2	PY3	PY4	Assumptions		
effective community renewable energy deployments are facilitated by capable stakeholders who support & empower communities to develop and own renewable energy projects and in so doing support the effective development of the renewable energy sector to provide development benefits for Malawian communities (the M&E framework has A needs based sustainable application of small scale decentralised Renewable Energy Technologies for households and communities)	% growth of fund for operations and maintenance over time	Planned	No fund	Fund established		Fund managed in transparent manner	Fund able to cover expected (from business plan) maintenance costs	That community off grid renewable energy is acceptable to local communities, and can be operated in a way that is inclusive for poor and marginalised individuals, households and communities.  The financial mechanisms for operations and maintenance can be made to operate in a transparent way, with appropriate support from financial and other institutions.  that appropriate technologies are available that are suitable to local conditions and that can be imported with minimal tax and obstruction whilst meeting appropriate technical performance standards to ensure appropriate lifespan use.		
		Achieved					Fund established in 12 CBOs Unclear if all funds sustainable.			
	<b>Data Source(s) for substantiating indicator progress</b>									
	Fund log books / bank statements and focus group interviews with fund / system managers; DO reports, end of project									
	Increased retention of school teachers and health clinic workers	Outcome Indicator 2	Planned	Community energy study indicated a problem with new teachers / teacher retention (anecdote)		Teacher engagement in planning processes			Teacher retention at schools with new installations indicated as higher / teacher satisfaction.	
			Achieved						Benefits to teachers and health clinic staff from lighting Teacher Retention Survey states higher teacher satisfaction	
		<b>Data Source(s) for substantiating indicator progress</b>								
		DEM data source, focus group interviews, evaluation report on community energy, learning study / key informant interviews, teach satisfaction survey.								

CEDP 3	CEDP 3.1		Baseline	PY1	PY2	PY3	PY4	Assumption	
	Number of CBO's / Projects in place through MREAP support and with relevant software (cofinance / bank accounts, businesses in place)	Planned	no support			44 projects commissioned under MREAP G/L funding	Continued operation of projects	That loan finance was to be available - but this was not the case, so all funding for the installations comes from MREAP with, in some cases, monetary input from the communities (% of total costs).	
		Achieved					46 projects commissioned		
	<b>Data Source(s) for substantiating indicator progress</b>								
	CEDP data sets collated by the DO's including bank accounts. Plus follow up during PY4 by IOD PARC.								
	Beneficiary numbers: Schools/pupils/teachers Clinics / patients / medical staff Households (solar lanterns / cookstoves) Others (CBO staff?)	Planned	to be obtained from PY4 monitoring	n/a	n/a	n/a			Collation of the beneficiary data from the CEDP database.
		Achieved							20,439
	<b>Data Source(s) for substantiating indicator progress</b>								
	CEDP 3.3	Establish a local organisation to support community developed RE projects	Planned		Scope the legal landscape regarding the setting up of a suitable organisation	CEM legally registered	CEM operating efficiently		CEM established beyond SG funding with full business plan and relevant funding in place
			Achieved						CEM registered and operating from January 2015. However no core funding beyond end March 2015
		<b>Data Source(s) for substantiating indicator progress</b>							
CEM documentation including business plan									

### *Challenge to assessing effectiveness*

MREAP was an action research grant that assumed a low level of local knowledge around modern energy services and their appropriateness to local community needs. The diversity of the portfolio makes it difficult to judge effectiveness. To counteract this, CEDP spent 2 years dedicated to building community capacity and ownership. The key finding from a review of documentation, key informant interviews and focus groups discussions is however that there were three major risks associated with CES' approach that had to be mitigated.

- Firstly, CES' inexperience in planning and managing in a development context arguably led to too many sites being chosen without any<sup>1</sup> planning and/or management of the amount of total effort that would be required to work over the large geographical area for the budget and time available. The result for CES was much higher support costs than anticipated. These unanticipated costs were borne by CES solely.
- The second risk was at the project level. Arguably, a lack of planning and management could contribute to a reduction in the sustainability of project outputs and achievement of project outcomes. More time will need to pass before it is clear whether or not this is the case. However, it is the case that Development Officers were not able to spend as much time as required with communities because they were travelling so often between sites.
- The final risk was internally to MREAP from CEDP that the DOs and CES would not have the necessary time to dedicate to monitoring and supporting the roll out of tools associated with collecting and storing data. This was also the case and resulted in additional time being spent by IOD PARC and Strathclyde University to ensure data was collected and stored.

In addition, at 6 months it is arguably too early to assess which interventions are most effective and whether CEDP projects and the CEDP approach are contributing to development outcomes<sup>2</sup>.

Instead therefore this section focuses on analysing the type and range of benefits experienced by beneficiaries through the Sustainable Livelihoods Framework and makes tentative conclusions about what these might mean for overall effectiveness.

### *To what extent are off-grid energy management interventions contributing to development outcomes?*

The Sustainable Livelihoods Framework was chosen to help define the different forms of capital that have been built as a result of CEDP interventions. The analysis does not include an assessment of the vulnerability context, nor of the wider policy environment, however, the theory assumes that changes in the assets of any one capital over time result in different livelihood strategies being adopted, which in turn leads to different/improved livelihood outcomes.

The Sustainable Livelihoods framework is multidimensional and assesses changes in different types of capital: human, natural, financial, social and physical. Please see the table below for the types of assets included under each area of capital. Those with a '✓' are relevant to CEDP projects.

Human	Natural	Financial	Social	Physical
✓ Health	Land & produce	✓ Savings	✓ Networks & connections	✓ Infrastructure – energy, WASH, secure buildings,
Nutrition	Water	✓ Credit/debit	✓ Trust & support	

<sup>1</sup> Development Officers planned their work and submitted these workplans to CES. However, no documented evidence was found during the process evaluation for the total national plan being reconciled against actual budget/time available.

<sup>2</sup> Development outcomes in this context are seen to be improvements in livelihoods for the poorest and most disadvantaged in Malawi.



✓ Education	✓ Trees and forests	Remittances	Formal & informal groups	communications
✓ Knowledge & Skills	Wildlife	Pensions	Common rules	Tools & technology
Capacity to work	Wild foods	Wages	Collective representation	
Capacity to adapt	Biodiversity		✓ Mechanisms for participation in decision making	
	Environmental services		✓ Leadership	

An analysis of CBO 6 monthly monitoring reports, DO 6 monthly regional monitoring reports, M&L Framework data validated by the in-country FGD and key informant interviews provides the following breakdown of benefits by type of capital: human, natural, financial, social and then physical.

Human	Evidence of benefits
Health	<ul style="list-style-type: none"> <li>- Reduction in exposure to fumes from fuelwood due to increased efficiency of cookstove.</li> <li>- Increased access to healthcare for the poorest who could not afford a candle when requiring treatment at night. In particular, increased number of safe and healthy deliveries at labour ward since the introduction of lighting.</li> <li>- Increased benefits of reliable communications through the ability to charge mobile phones locally and being able to call ambulances when required</li> <li>- Reduced fire related incidences caused by kerosene lamps because solar lanterns are now being used</li> <li>- CBO offices have been able to power a TV, video player, computer and fan. They now show health videos to raise HIV/AIDS awareness. This is to be commended because at present there is no trained health officer in the area.</li> </ul>
Education	<ul style="list-style-type: none"> <li>- Quality and relevance of education improving: by improving teacher retention, improving pupil attainment (PSLC) at the zonal level through an analysis of DEPs and M&amp;L data;</li> <li>- Improved education chances: Increased number of secondary school pupils or other adults/professionals studying at primary schools with solar pv lighting demonstrated in 6 monthly regional monitoring reports;</li> <li>- Increase in time learners spend studying at home with the solar lanterns.</li> <li>- Digitisation of schools: Increased demand for digital assets at primary schools with solar pv – e.g. printer, scanner</li> </ul>
Knowledge & Skills	<ul style="list-style-type: none"> <li>- All CEDP communities now have a high degree of awareness of RETs</li> <li>- Business planning with CBOs and training in financial management has increased the capacity of the CBOs</li> <li>- CBO offices have been able to power a TV, video player, computer and fan. They now show health videos to raise HIV/AIDS awareness. This is to be commended because at present there is no trained health officer in the area.</li> </ul>
Natural	Evidence
Trees & Forests	<ul style="list-style-type: none"> <li>- A reduction in the rate of deforestation near to cookstove producer groups because users of cookstoves do not need as much fuelwood on a weekly basis.</li> </ul>
Financial	Evidence
Savings	<ul style="list-style-type: none"> <li>- Families can save money once the solar lantern is paid off for other household amenities.</li> <li>- More time to dedicate to home life and economic activities as less fuelwood collection is required and less time is spent collecting water</li> </ul>
Credit/Debit	<ul style="list-style-type: none"> <li>- The use of village savings and loans approach in Central district to finance cookstove and solar lantern projects.</li> </ul>

Social	Evidence
Networks & connections	<ul style="list-style-type: none"> <li>- Increased benefits of reliable communications through the ability to charge mobile phones locally and being able to call ambulances when required</li> <li>- Excellent relationship and coordination between communities and contractor facilitated by the DOs</li> </ul>
Trust & support	<ul style="list-style-type: none"> <li>- Excellent relationship and coordination between communities and contractor facilitated by the DOs</li> <li>- Reduction in community conflict through a fairer distribution of water resources through water kiosks demonstrated in Balaka. The new systems provided improved access to water for 168 households in Lijera village and 900 learners at Mikwala Primary School.</li> </ul>
Decision Making	<ul style="list-style-type: none"> <li>- Reinforced role for CBO in running social enterprise and managing solar PV installations. Plus a new Energy Management Committee structure in place in all projects. Clear roles and responsibilities have allowed for open and constructive discussion about finance in most cases.</li> <li>- Furthermore in Kuntiyani community the decentralised management of the water project stands out. The EMC through the Chiefs created an approach where each water kiosk has its own water subcommittee which monitors the sanitation of the kiosk as well as ensuring that community members using the kiosk pay for the maintenance – contribution of K300 per term. Through this process and the subcommittees a bylaw has been passed which enforces the proper management of the kiosks.</li> </ul>
Leadership	<ul style="list-style-type: none"> <li>- Chiefs from several villages came together to finance the security guard for school systems</li> </ul>
Physical	Evidence
Infrastructure – energy	<p>A total of 87 new systems have been implemented to increase the physical asset base of communities in Malawi. This is broken down into:</p> <ul style="list-style-type: none"> <li>- 31 number of solar pv installations across 3 regions and 12 districts</li> <li>- Support to National Cookstove Taskforce through 4 cookstove projects and the construction of 2 cookstove shelters.</li> <li>- 2 solar water pumps</li> <li>- 50 household solar pv systems</li> </ul>

In summary, livelihood gains have been achieved across all types of capital. The most comprehensive results achieved are under human and social capital because a greater number of assets are addressed by CEDP projects. A selection of excerpts from the CBO 6 month monitoring reports now follows on access to healthcare, cookstove benefits and access to education related benefits.

Access to healthcare: excerpt from Umodzi CBO, Machinga District 6 monthly monitoring report.

*'Before solar PV installations at Namanja Health Centre, everyone including expectant mothers who wanted a medical help at night were asked to bring either candles or torch for health personnel to help them. This prevented other people who could not manage to buy these lighting gadgets from accessing free medical care. Soon after installations people were delighted to see lights at their health facility as they knew from that time on, they would access medical care even at night without bringing a candle. This increased number of people seeking medical care at night and also expectant mothers coming to the facility for safe delivery. This was like a dream come true for Mpiranjala communities who are situated about 35km from Ntaja, the nearest grid and trading centre'. Please refer back to map of Mpiranjala community on page 33. Walking from their home to Ntaja is equivalent to a mother in labour walking from Edinburgh to the outskirts of Falkirk or vice-versa to access healthcare.*

Education related: Excerpt from Mnzona CBO 6 monthly monitoring report, Ntchisi district

Mikwala primary school is located in the area of Traditional Authority Chikho in Ntchisi district, Central Malawi. The school is one of the least developed areas in Ntchisi partially due to its geographical position as it is surrounded by some mountains and Ntchisi game reserve. Access to electricity is a non-starter in the area, and electricity demanding services such as barbershop, maize mill and others used to be accessed at Ntchisi boma. The school used to have low enrolment rate due to its poor track record on the outcomes of Primary School Leaving Certificate Examinations (PSLC). However, the condition of the school is slowly improving due to the interventions done by Community Energy Development Program (CEDP). Through Chiwinzi CBO, the school has benefited in the Scottish government funded CEDP grant, and among other things CEDP electrified the school and 2 teachers' houses. Apart from this, the program also provided small solar home lighting systems (solar lanterns) which have been sold to the surrounding community. Since its inception in the area, the program has brought a number of significant impacts. Some of the notable impacts have been the increased enrolment rate at the school. Electricity has attracted more learner's to enrol at the school. 'Currently we have started self-boarding initiative for standard 8 learner's to give them ample time of studying even at night, thanks to CEDP for this electricity, and we are hoping that we will do better this year' commends with their past when they used to have paraffin powered lamps.

Cookstoves: Excerpt from Lipenga CBO, Lilongwe district, 6 monthly monitoring report

*'Chitekwere community is one of the neglected places as far as rural development interventions are concerned in Lilongwe district. This is mainly due to the bad road terrain. Despite this CEDP has implemented a successful cook stove project. The project has made significant changes in the lives of community members especially on usage of fuelwood. Previously women had to walk 0.5-1 kilometre 3 times a week to collect firewood. However, with the coming of the cook stoves intervention by CEDP community members have adopted the use of a cook stove which saves firewood, produces less smoke, and minimizes the time they spend fetching for firewood. As such women have more time to do other things such as participating in irrigation farming, as most community members are engaged in this activity.'*



*Top photo is of cookstove producer group in Chitekwere and the bottom photo is of the official handing over ceremony of the project from CEM to the community.*

## ii) What are the most effective off-grid energy management projects overall?

As clearly set out in ‘Challenges to measuring effectiveness’ the focus is on defining emerging conclusions around effectiveness. To do this against this question, the evaluation team analysed the number and type of changes in capital assets that different installations (solar PV health, solar PV education, solar PV CBO, solar PV household, solar water pump, solar lantern, cookstove) bring. The analysis looked at the changes in capital levels (as per earlier tables) by aggregating the type of installation i.e. greater number of ✓s the greater the impact of project on the level of capital/asset.

Human	Evidence of benefits	Analysis	Conclusion
Health	<ul style="list-style-type: none"> <li>✓ Cookstove</li> <li>✓ ✓ Solar PV Health</li> <li>✓ Solar PV Education</li> <li>✓ Solar lanterns</li> <li>✓ Solar PV Office</li> </ul>	Health benefits are accrued across all types of installations. The direct placement of solar pv systems on health clinics unsurprisingly brings direct health benefits.	There are many and varied improvements to human capital because of the CEDP installations. All installations have contributed to this but in particular those on educational and health institutions.
Education	<ul style="list-style-type: none"> <li>✓ ✓ ✓ Solar PV Education</li> <li>✓ Solar lanterns</li> <li>✓ Solar PV Office</li> </ul>	Education benefits have been accrued at local and district level. There are immediate benefits to households from using solar lanterns.	
Knowledge & Skills	<ul style="list-style-type: none"> <li>✓ Cookstove</li> <li>✓ Solar PV Health</li> <li>✓ Solar PV Education</li> <li>✓ Solar PV Household</li> <li>✓ Solar lanterns</li> <li>✓ Solar PV Office</li> </ul>	There has been a consistent improvement in knowledge of all CEDP renewable energy technologies.	

Natural	Evidence of benefits	Analysis	Conclusion
Trees & Forests	<ul style="list-style-type: none"> <li>✓ Cookstove</li> </ul>	Learning from the National Cookstove Programme in Malawi allows CEDP to assume environmental benefits.	Cookstove projects demonstrate immediate benefits in terms of an improvement in trees and forestry assets through reduced deforestation at community level.

Financial	Evidence of benefits	Analysis	Conclusion
Savings	<ul style="list-style-type: none"> <li>✓ Cookstove</li> <li>✓ Solar Lantern</li> <li>✓ Solar water pumps</li> </ul>	Households are making savings from cookstove and solar lantern projects due to a decreased expenditure on candles and dry cell batteries.	Households are experiencing immediate benefits to their levels of financial capital by adopting lanterns and cookstoves.
Credit/ Debit	<ul style="list-style-type: none"> <li>✓ Cookstove</li> <li>✓ Solar Lantern</li> </ul>	VSL schemes are enabling those adopting lanterns and stoves to benefit from credit.	

Social	Evidence of benefits	Analysis & Conclusion
Networks & connections	<ul style="list-style-type: none"> <li>✓ All Solar PV installations</li> <li>✓ Solar lanterns (with mobile</li> </ul>	Solar PV installations on educational institutions and solar water pumps have produced the greatest increase in social capital through improvements in trust, decision making structures and leadership.



	phone charging capabilities)	Solar PV installations and solar lanterns also increased the network and connections assets through mobile phone charging facilities.
Trust & support	<ul style="list-style-type: none"> <li>✓All Solar PV installations</li> <li>✓Solar Water Pump</li> </ul>	
Decision Making	<ul style="list-style-type: none"> <li>✓All Solar PV Installations</li> <li>✓Solar Water Pump</li> </ul>	
Leadership	✓Solar PV Education	

Physical	Evidence of benefits	Analysis & Conclusion
Infrastructure – energy	All RE installations	There has been an increase in the infrastructure asset base (energy) because of CEDP projects.

In summary, all types of CEDP projects have contributed to building human capital. Solar PV installations on educational institutions and solar water pumps have produced the greatest increase in social capital through improvements in trust, decision making and leadership. Solar PV installations and solar lanterns also increased the network and connection assets through mobile phone charging facilities. Cookstove projects singularly contributed to the increase in natural assets of forestry and both solar lanterns and cookstoves provided immediate benefits to levels of financial capital in terms of savings and access to credit.

### iii) How effective was the use of CBOs to manage the interventions?

As stated at the beginning of the effectiveness section, the two key challenges to measuring effectiveness are: i) the diversity (geographical and type of installation) of the portfolio; and ii) the timeframe for witnessing changes at the beneficiary level. The CBO model of community engagement is analysed throughout the process evaluation: relevance considers the appropriateness of the capacity building approach of the CBO model, the efficiency of the CBOs is analysed, a risk assessment of using the CBO model is conducted and lifecycle costing modes are used to ascertain the sustainability of the project O&M funds managed by the CBO. This sub section brings together these analyses to summarise the overall effectiveness of the approach.

- Highly relevant with mixed levels of efficiency

The evidence in favour of the CBOs’ effectiveness focuses on their longstanding within the community; the fact that they are a recognised structure by the district office and that through them Chiefs and other structures can play an important role and experience a strong sense of ownership. For example, after realising the importance of the project and its financial demands from the CBO, 16 chiefs surround Mikwala primary school in Central Malawi mobilised their communities to contribute on a monthly basis towards the maintenance of the system fund. These findings are validated by the Sustainable Livelihoods analysis of social capital in terms of increased decision making power and leadership.

Unfortunately, however CBOs have not had any investment in them for many years and are therefore critically low in capacity to manage projects. In addition, to this the illiteracy rate of some CBOs has resulted in poor record keeping. On most occasions the DO would leave the data collection forms with the communities to fill out but on a return trip the DO would find the form had not been filled out. This factor was compounded by the size and type of regional portfolios; some DOs had to travel great distances on a monthly basis to reach the CBOs and provide support.

- Innovative social enterprise model that improves human, social, financial, physical and natural capital.

The business planning process led to all CBOs functioning as social enterprises with income generation visible at 6 months. However the analysis of lifecycle costing highlights the need for ongoing support and monitoring of O&M funds to ensure sustainability of the projects.

## Efficiency

This section of the report sets out what funding has been spent on, the extent to which the portfolio of CEDP projects demonstrates what elements *contributed to or hindered* the achievement of outputs. The analysis is set out in two parts. The first looks at a random sample of CBO business plans built into lifecycle costing models and the second analyses the evidence of value for money. The section begins by detailing what money was spent on under CEDP<sup>41</sup>.

### *What was money spent on?*

The total budget available to the CEDP component of MREAP was £871,351<sup>42</sup>. Graph 10 below shows the breakdown of the funding. The greatest proportion of spend was on labour: CES staff (31%) and Malawian staff (DOs, National Coordinator and Finance Officer) 9%. The remaining spend was split between capital expenditure on installations (35%) and project management in Malawi (23%) with a small proportion on international travel (2%). Table 9 below then details the breakdown of the total spent per item as a proportion (%) of the total grant.

Graph 9: CEDP expenditure

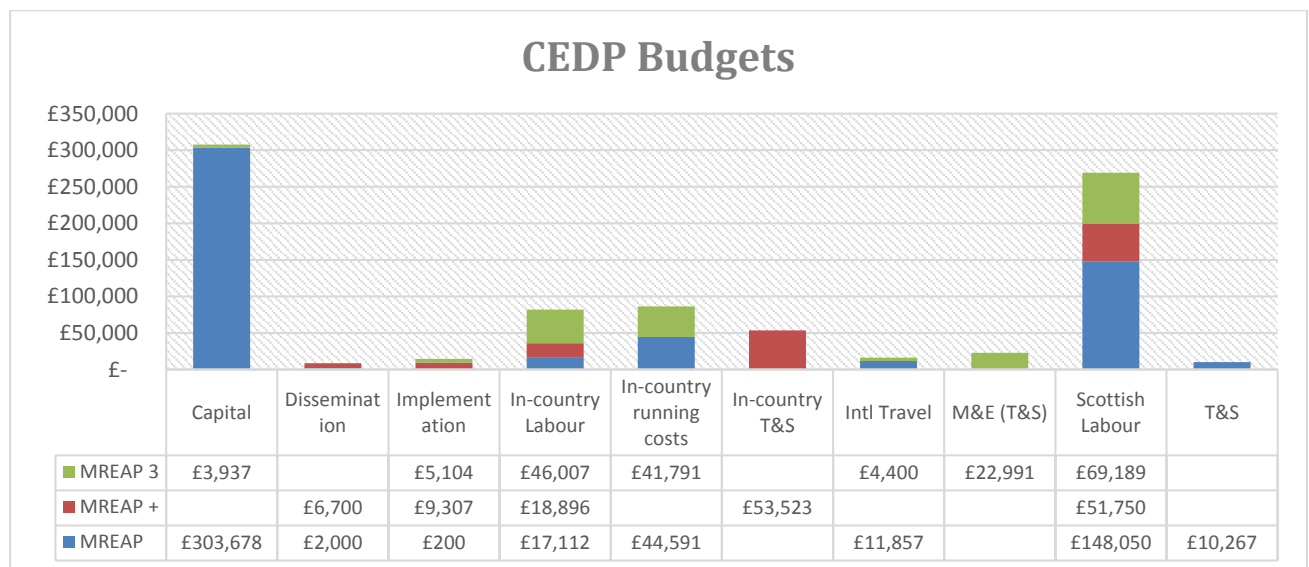


Table 9: Breakdown of major proportions of money from MREAP for CEDP

	Scottish Labour (CES staff)	In-country Labour (DOs)	Total Labour (Scottish & Malawian)	Total Capital	Total in-country T&S	Intl Travel	Total £ from MREAP for CEDP
Total	268,989	82,015	<b>351,004</b>	<b>307,615</b>	<b>196,474</b>	<b>16,257</b>	<b>871,351</b>
As % of total grant	31%	9%	<b>40%</b>	<b>35%</b>	<b>23%</b>	<b>2%</b>	<b>100%</b>

<sup>41</sup> Based on expenses and estimates as of February 2015.

<sup>42</sup> The original budget given to CEDP is demonstrated by the figures against MREAP. In 2013 additional funding was given to support installations in the form of MREAP 3. MREAP+ is the extension grant when MREAP ran for one further year 2014 – 2015.



CES' financial system is based on budgeting for labour, overheads, travel and subsistence (T&S). Through these line items, the 46 projects have been designed, implemented and delivered. The sub-contracting procedures and reporting to Strathclyde University did not require either Strathclyde or CES to stipulate cost per stage of project or indeed to be able to justify spend per 'output'. However it is possible to state the following costs per output:

- Setting up and running the first Community Energy Conference in Malawi cost around £8000
- Design, development and finalisation of the community renewable energy toolkit cost around £7000.

*What does an analysis of the project evidence suggest about the efficiency of different types of installations?*

To answer this question, a small sample of CBO business plans have been verified and modelled into lifecycle costing models by using 6 month monitoring data. It has then been possible to generate an approximate cost per beneficiary for each project by making some general assumptions. In addition to this figure, it was also then possible to calculate the total lifetime cost of a system against the total anticipated income generation and whether or not the project was on track to meet its 9 month target. However, again it must be noted that at the 6 month mark it is important to **treat these results with caution**. When additional monitoring data becomes available and more is known about the income generation activities as well as the savings the cost could well be higher or lower than the figures in March 2015. Finally the results from a small sample of CBO financial health checks are presented to evidence the current efficiency of the financial processes and systems at the project level.

- Lifecycle costing model

Lifecycle cost modelling is a benchmark standard in the Water, Sanitation and Hygiene (WASH) sector. It is considered to be the most appropriate approach to tackling the systemic problem of lack of finance for ongoing maintenance and operation (e.g. the failure rate of hand pumps is very high). **It is a way of projecting costs for a system up to the point of rehabilitation or replacement.** It was then possible to calculate the current efficiency (high, medium or low) of the projects to reach their 9 month target balance, as reported in the business plan. An excel model based on the figures contained in the application form and business plans for each technology/ system was constructed (please see annex 4). This model categorised: capital costs, system savings, system costs and income generation streams. This was then set out over a 1 to 25 year period covering the complete lifecycle of a solar panel and arguably also a solar water pump.

Of the 46 projects, it was important to validate a sample of the CBO project business plans. An appropriate sample is one that includes the following:

- One CBO from each region;
- Projects that represent (generally speaking) the diversity of the CEDP portfolio;
- Business plans with as detailed as possible costs, income streams, savings and known repair items costs from which to generate the models;
- A large CBO system that includes: CBO office lighting, multiple primary and secondary schools, teachers houses, teacher development centre
- An average (for CEDP) CBO system: installation of solar PV for schools and houses with solar lanterns; and,
- A small non solar PV CBO system focusing on cookstoves and lanterns.

The business plans of 3 CBOs were selected for validation: i) Maukako CBO in Chitipa District, Northern Region; ii) Umodzi CBO in Machinga District, Southern Region; and, iii) Mnzona CBO, Dowa District in the Central Region.

Annex 4 sets out in detail the analysis against each business plan. Below are the key findings for each CBO.

- **Chitipa District, Maukako CBO Efficiency: low**

In Chitipa District, Maukako CBO installed a solar pump, rolled out a solar lantern projects and provided lighting for the CBO office, teachers’ houses as well as 6 Primary schools (Miwanga, Mahowe, Uledi, Chiguza, Kalopa and Chiungumile) and 1 secondary school (Mibanga).

From running the lifecycle costing model (N.B. and taking into consideration that the model is based on projections), it is possible to calculate that by Year 5 the projects run by the CBO will not be raising sufficient capital to maintain the systems under their management. It is also currently unlikely to meet its 9month target. However there is evidence of household savings.

In the case of Maukako CBO from Chitipa District the total income raised <sup>43</sup> in the last 6 months was K1, 170,000, expenses totalled K50, 000 and including the opening balance, the account balance stands at K1, 412,500. The target 9 month balance for creating a sustainable system is K5, 934,025 as reported in the business plan. Therefore currently, Maukako CBO needs to raise K4, 521,525 in the next 3 months to meet this target and the objective of maintaining all systems in their area to an acceptable standard over their lifetime.

Over the 14 households electrified (through solar PV) average household expenditure on electricity before the solar installations was between K2000 to K3000. This has now dropped to a one off monthly payment of K1, 500. Therefore households are saving between K500 and K1500 every 3 months with the benefit of solar PV.

In Year One the model estimates that a total of K142, 000 is being saved by the total targeted population [86,000 (water pump) +56,000 (solar PV)].

**Cost per user:** a very crude calculation has been done to estimate if, total end users equal 2779 and total cost of systems for Maukako is K11, 188,494.60, then a cost per user is K4026.

- **Machinga District, Umodzi CBO Efficiency: high with reservations**

Umodzi CBO rolled out the lighting of Mpiranjala Primary School, Teacher Development Centre, Secondary School, Health Centre and also a solar lantern project.

The **lifecycle costing model** for Umodzi CBO suggests that, if all things remain equal and the income generation remains stable, the CBO will have sufficient funds to pay for systems maintenance and also for system rehabilitation after 25 years.

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<sup>43</sup> Unfortunately, data was not available for all projects associated with this CBO therefore actual figures (both income and expenses) could be higher or lower when these are taken into consideration.

This means that it is generating sufficient income to sustain the systems, meet its 9month target, including repair and replacement of solar panels in 25 years' time. However, there are reservations because there is no baseline data for household expenditure from which to model household savings and expenditure.

**Monthly electricity fees** are now being paid (K1000) by the teachers whose houses have been electrified. Without baseline data it is not possible to demonstrate household savings.

Total number of **end users** is 1489 broken down into 786 male, 687 female learners, 15 male teaching staff and 1 female teacher.

The total **capital cost** of the system was K11, 188, 494.6; with total beneficiaries of 1489 this means a cost per head of K7514 for the system. As no baseline was collected for Umodzi it is not possible to demonstrate how much users are saving at the household level but it reasonable to expect that there are some savings for those benefiting directly from solar PV in their homes, namely the teachers and their families.

There are **direct savings** for the families of learners at the school. On average a pupil in standard 7 or 8 would spend K600 a month on dry cell batteries for a torch. Therefore an average household can expect to save K7200 in a year.

No. of **live births** has increased over the initial 6 months at the Health Clinic: Baseline (March, April and May) = 154, 3 months (June, July August) = 204 and 6 months (Sept, Oct, Nov) = 378.

- **Dowa District, Mnzona CBO Efficiency: not possible to determine**

Mnzona CBO implemented household cooking and lantern projects.

Unfortunately data is very limited from which to make a lifecycle model for the cookstoves and solar lanterns used in this community. Therefore it is not possible to determine its efficiency.

- From the information provided in the business plan it is not possible to set out a business model for Mnzona CBO. There are critical gaps including: projections (costs and savings) for rest of year ahead (2015), Yr. 2 and so on, cost of replacement batteries for larger solar devices and savings made in community by using lanterns.
- Total capital cost of CBO project is as follows: K14,985,000 (cookstoves) + K446,200 (lanterns) = K15,431,200 which with an estimated number of end users taken as the total number of units sold 204 +30 = 234 is a cost of K65, 945 per head.

- **General observations and feedback on CBO efficiency**

It is too early (6 months) to judge the medium to longer term efficiency of these projects. There is limited up to date information on the current success of the various revenue generating services bar those included in the M&L Framework. All models include the projections from the business plan however one DO intimated that additional modelling had been done. Income generation may have been delayed in some and in others it may be more

than was projected. It is felt that the following observations are reasonable taking into consideration these factors.

- All business plans focused on monthly costs. There was no projection to annual or multi-year income and cost: this inhibited a longer term view of system costs and how these compared to the overall system savings and income generation activities over time.
- The total financial contributions from communities were included on individual technology business plans but not aggregated into one contribution (to be managed by the CBO). It remains unclear which of these contributions were made and the extent to which the CBO and the community were aware of the initial outlay to support activities.
- Some critical data is missing and it is not possible to build a complete lifecycle model without this. The financial health checks (see Annex 5) conducted raised concerns about the quality of record keeping.

### *Value for money*

A framework commonly used to assess the value for money of larger programmes of work implemented by NGOs has been used to further analyse the efficiency of CEDP. The framework is called the 3 Es Framework (Efficiency, Economy and Effectiveness). It is an effective way of analysing a growing organisation with ambitions to partner with international organisations overseas<sup>44</sup> and to set out what is deemed acceptable within this environment. It will also help to answer the questions: How well coordinated and managed are individual off-grid energy management interventions? How well coordinated and managed are off-grid interventions across and between actors at the national level?

In the framework, economy relates to the costs and the inputs, efficiency looks at how these inputs are translated into outputs and effectiveness looks at the outputs (from a qualitative and quantitative perspective) to see how they contribute to outcomes. Together this is the 3 Es framework.

There are various benchmark mechanisms that sit behind an organisation's drive for economy, efficiency and effectiveness. For the purpose of this evaluation, a set of mechanisms have been selected that are appropriate to CEDP and an assessment has been made against each (see table 10). Then an overall judgment about whether the mechanism is fit for purpose (red, amber or green) is made, in comparison to a benchmark NGO<sup>45</sup> and what they have in place.

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<sup>44</sup> CES announced in 2014 its intentions to create an international wing of its business. Georgy Davis the CEDP manager is the manager of this.

<sup>45</sup> The 3 Es approach used CAFOD and WaterAid as benchmark standards.

**Table 10: Light touch Assessment of CEDP against 3 E Value for Money approach & mechanisms**

Mechanism	Description of what was found	Assessment from Evaluation	NGO 'standard'
<b>Economy – Amber</b>			
Clear documented finance policies and procedures for CEDP projects	<ul style="list-style-type: none"> <li>CES procedures require all budget holders to obtain supplies, equipment and services at the lowest possible cost consistent with quality, delivery requirements and sustainability</li> <li>CEM have a draft financial policies and procedures manual in place and a CEM terms of conditions of employment document</li> </ul>	<ul style="list-style-type: none"> <li>3 quotes were sourced for procurement at a district level.</li> <li>CEM is in the process of finalizing their financial policies document. The <u>application</u> of this document would provide evidence for a 'green' rating.</li> </ul>	<ul style="list-style-type: none"> <li>Documentary evidence available: original quotes and reason for selection of successful quote.</li> </ul>
Partnership Agreement – mode of employment	<ul style="list-style-type: none"> <li>CES has MoU in place with Polytechnic to employ the DOs.</li> <li>National Coordinator and Finance Administration and Communications Officer are employed by CES.</li> <li>DO salaries were based on 'project' contracts at a lecturer grade</li> <li>CEM registered and operational January 2015</li> <li>Conducted local community skills audit and capacity assessment</li> </ul>	<ul style="list-style-type: none"> <li>Because the DOs lecturer grade was classified at the Polytechnic as 'project', increments that have been received by other 'non-project' lecturers have not been passed on to the DOs. The DOs are also not entitled to the other benefits that this grade normally affords (e.g. house allowances, access to loans)</li> <li>Remote partnering with CES meant that the process of reconciliation and management of expenses to DOs was very slow and held up field visits.</li> </ul>	<ul style="list-style-type: none"> <li>Articulated framework for new operation being set up</li> <li>Financial guidelines for partners (in CEDP's case this would be with CBOs)</li> </ul>
Pay reviews	<ul style="list-style-type: none"> <li>CES conducts periodic pay reviews to ensure that it is paying appropriate rates of pay to its entire staff.</li> <li>CEM now has the conditions of service document which will guide the review of salaries.</li> </ul>	<ul style="list-style-type: none"> <li>CEM salary scale in draft policy document is not in line with current salaries. Finance Office hopes that the Board will rectify this when it reviews business plan end March 2015.</li> </ul>	<ul style="list-style-type: none"> <li>Transparent and documented pay review for Scotland and Malawi</li> </ul>

<b>Efficiency – Amber/Red</b>			
Staffing/ structural reviews	<ul style="list-style-type: none"> <li>7 staff in total: 2 CES staff and 5 CEM staff dedicated to CEDP (3 regional staff members, 1 national coordinator and 1 finance officer)</li> <li>Ideal structure in conditions of service allocates additional roles to: M&amp;E, district officers and support to finance.</li> <li>National Coordinator in place for 15 months working towards registration of CEM</li> </ul>	<ul style="list-style-type: none"> <li>It is unclear why certain policies and procedures weren't developed and approved by the Board, while CEM was in the process of being registered.</li> <li>In theory operations have been managed locally in Malawi since Edgar joined team. However the overlap of support/guidance by CES to the new enterprise has been necessary.</li> <li>While the diverse geographical area covered by the CEDP portfolio has triggered interest far and wide in RE, it is fair to say that the operational structure was ambitious and stretched the DOs too thinly.</li> <li>If possible it would have been important to minimize the number of districts at regional level and consider someone with district level responsibility e.g. development administrator who supported the regional development officers.</li> </ul>	<ul style="list-style-type: none"> <li>Evidence of review of staffing numbers and structures to maximize staff efficiency and effectiveness</li> <li>Reality check – how much support and on what - does a new organisation need?</li> </ul>
Fundraising 'return on investment' (ROI) benchmarks	<ul style="list-style-type: none"> <li>Funding Database created in June 2014 by CES.</li> <li>A supporting note was written by IOD PARC on potential funding options for CEM in Nov 2014.</li> <li>CES have spent a total of 56.3 days</li> </ul>	<ul style="list-style-type: none"> <li>2.3 days of fundraising have been supported by CEDP funds this year. The remaining 54 days have been supported by CES core funding.</li> <li>Current success rate is 1 in 7 and this did not result in additional funding for CEM.</li> </ul>	<ul style="list-style-type: none"> <li>A generally recognized sector standard of a 1:4 return on investment, to ensure efficient</li> </ul>

### Efficiency – Amber/Red

	<p>involved in 10 separate bids this FY. They submitted 5 unsuccessful bids for funding. 1 further bid was successful but this was for marketing (not core funding). They withdrew from 1, are awaiting decisions on 2 further bids and are in the process of submitting 1.</p>	<ul style="list-style-type: none"> <li>It appears that the CEM Board recognises that it has not provided fundraising support to CES.</li> </ul>	<p>use of funds spent on fundraising</p>
Key financial policies and procedures	<ul style="list-style-type: none"> <li>Draft financial policies manual.</li> <li>CEDP has reported variance to Strathclyde University as part of quarterly reporting. These were not reviewed as part of this assessment. At project level (CBO) critical gaps in mini financial health checks of a small sample of CBOs (please see annex 5)</li> <li>A detailed business plan is in place which sets out by objective what CEM hope to achieve and the projections/costs related to this.</li> <li>CEDP staff bank accounts have been used to channel project funds in the absence of CEM accounts.</li> </ul>	<ul style="list-style-type: none"> <li>CEM has begun to fill the gaps in financial management through the policies, detailed business planning and conditions of service.</li> <li>It is imperative that CEM now finalizes the business plan and policies document and begins to build the systems internally for the roll out of these documents.</li> <li>CEM Board is meeting Friday 27<sup>th</sup> March 2015 and it is the Finance Officer's intention to approve signatories for 3 regional accounts. During that week, prior to the Board meeting, DOs will open regional CEM accounts.</li> </ul>	<ul style="list-style-type: none"> <li>Use of key financial policies and procedures, designed to ensure efficient use of funds. These include cash flow procedures; Reserves Policy, Exchange rate Policy.</li> <li>Keeps clear track on variances between approved budgets and end of year accounts which enables organisation to monitor spend against income.</li> </ul>

### Effectiveness – Amber

Scoping and research studies	<ul style="list-style-type: none"> <li>A scoping study was completed prior to commencing MREAP.</li> <li>The Evaluation Case Studies provided evidence of the types of projects in Malawi.</li> <li>IOD PARC MREAP Baseline Report, June 2014 articulates why original baseline data and deliverables had to be altered.</li> </ul>	<ul style="list-style-type: none"> <li>Many of the needs assessments did not adequately consider the local 'functional' context and key details associated with the working conditions on the ground e.g. number of buildings within community with access to modern energy services, number of households with access to modern energy services. As a result it is difficult to compare the level of intervention needed between the different sites and it will be more difficult to plan and implement practical changes which can be attributed to CEDP and MREAP.</li> </ul>	<ul style="list-style-type: none"> <li>Undertaking scoping and research studies, prior to undertaking work in new areas.</li> <li>Baseline process</li> </ul>
Partner selection procedures	<ul style="list-style-type: none"> <li>Procedures are in place for the selection and appraisal of CBOs.</li> <li>Community skills audits were performed before setting up EMCs.</li> </ul>	<ul style="list-style-type: none"> <li>Documents seen at a country level which illustrate clear process in assessing CBO partners and energy committee needs.</li> <li>No formal needs assessment carried out of DOs knowledge of M&amp;L. Missed understanding of why data was important.</li> </ul>	<ul style="list-style-type: none"> <li>Initial and ongoing assessment of partner capacity to monitor development and ability to implement projects.</li> </ul>
Partner monitoring and support processes	<ul style="list-style-type: none"> <li>DOs have played a strong role in community facilitation.</li> </ul>	<ul style="list-style-type: none"> <li>Illiteracy rates of communities and working with CBOs was a major barrier to monitoring and conducting training.</li> <li>Project risk assessments were not systematic</li> </ul>	<ul style="list-style-type: none"> <li>A risk-based approach to partner monitoring and support. This helps to ensure an efficient use of staff resources and through support visits helps to increase the effectiveness of partners' programme delivery.</li> </ul>



<p>Management development &amp; M&amp;E</p>	<ul style="list-style-type: none"> <li>Limited time and budget for building M&amp;L skills</li> <li>Unsuccessful deployment of local M&amp;E specialist to support DOs</li> <li>Remote management of DOs and of M&amp;L process was less than ideal</li> </ul>	<ul style="list-style-type: none"> <li>Limited shared view about approach or key capabilities necessary to manage projects effectively.</li> <li>Remote mgt of DOs difficult when in the field a lot of the time and communication patchy.</li> <li>Building M&amp;E learning and support process with CES was very difficult.</li> </ul>	<ul style="list-style-type: none"> <li>Individuals have clarity around areas for development and target work to support this.</li> <li>Sufficient managerial support in place.</li> </ul>
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*Conclusion*

At the project level, carrying out the lifecycle cost modelling suggested that 1 in 3 projects would meet its 9 month target for income generation. Concerns remain over gaps in evidence found in the business plans and therefore it seems a fair assessment to state that each project requires ongoing financial stewardship and accountability to increase efficiency. The value for money 3Es analysis has provided greater insight into where the gaps lie for CEM.

The operational set-up and management of CEDP has changed over the course of 3 years. The push for the creation of CEM was to ensure better efficiency, sustainability and value for money of CEDP. So, the delayed registration of CEM did result in inefficiencies. Unfortunately, the current structure of the financial data does not allow for more detailed analysis at this time.



## Sustainability

The findings of this section are structured by type of installation (solar PV, lanterns, cookstoves and household systems). When looking at solar pv installations the evaluation team considered sustainability from 3 perspectives: i) sustainability of the systems - current level of system functionality; ii) O&M funds; and, iii) readiness of local markets for scale up. For all installations the sustainability of the CBO and CEM remain central and are dealt with separately at the end of the section.

### *Solar PV*

- **System Sustainability**

During the project visits to solar PV installations full functionality health checks were carried out by the evaluators. Annex 6 contains the functionality health check proforma (designed by Peter Dauenhauer of the University of Strathclyde) that was used successfully and Annex 7 is a summary of the results. The functionality health check reviewed: solar panels, charge controllers, inverters, batteries and general health of system. A total of 28 systems were sampled as part of the functionality check across 3 regions. Of these 28, it was possible to visit and review 25. Unfortunately, due to flooding in the south it was not possible to visit the systems in Nsanje and they have not been included in the sample.

The 25 systems reviewed were: 2 in the central region in Balaka, 6 in the south in Machinga and 17 in the northern districts of Likoma and Nkhotakota. An analysis of the data states that a total of 55 solar panels were inspected and 93% were found to be functional. There are currently problems with 4 panels at the girls’ dorm on Likoma Island. Of the 25 charge controllers that were inspected, one was damaged by a leaky roof and replaced with one from a nearby teacher’s home. The 4 faulty panels at the girls’ dorm meant that it was not possible to check the functionality of the charge controller. Therefore, 23 out of 25 charge controllers or 92% were found to be working effectively. This was verified through a ‘green’ LED status light and appropriately tidy wires. Furthermore, a light touch review of the brands being used on site found that they were of a high quality and therefore it validated the assumption that a normal lifecycle (ie replacement in 5 years) is acceptable for the lifecycle costing used in the previous chapter.

Out of a review of 23<sup>46</sup> systems, a total of 20 inverters (or 86.9%) were found to be fully functional. The details of the other cases are as follows: in one case, there were concerns about an inverter’s performance (it may be replaced shortly); in the Machinga School staff room the inverter was not working; and, a further inverter had been sent for testing.

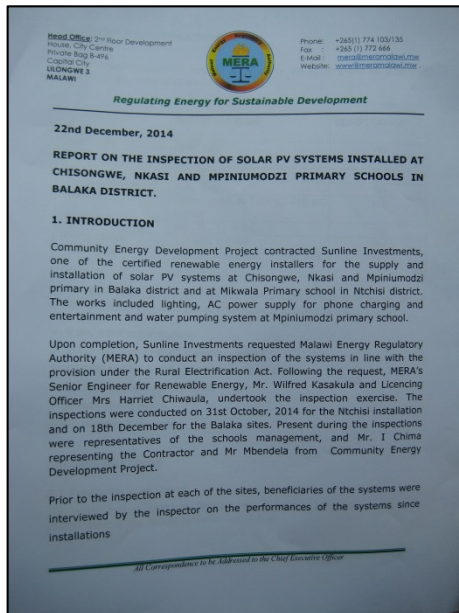
A total of 74 batteries were inspected. All were connected directly to the charge controller. 25 batteries or approximately a third of batteries, across 9 projects were found to be dusty. None were found to be corroded. A problem has been reported in Machinga with the batteries in the health clinic’s maternity wing and OPD. These 12 batteries are due to be inspected by the contractor again to determine whether there is an issue with quality.

The loads of the installations vary greatly. A total of 172 bulbs were tested, of these 27 were found to be not working, however of these, 17 were due to problems with the system. Therefore for the purpose of this installation, only 10 or 5.8% of the total number are

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<sup>46</sup> 2 systems were designed without inverters.

considered to be in need of replacement. Of particular concern was the system in the Health Clinic OPD where the Health Manager’s switch is not working and he cannot use the available lighting in his office or his treatment room. It has been like this for 4 months. 18 of the 25 systems (72%) support mobile phone charging.



In summary, 93% of the total number of systems reviewed were fully functional. It appears that by using MERA accredited contractors and having all installations quality assured by MERA (please see photo to left and annex 8 for an example report), the quality and functionality of the systems is high. CEDP benefited from the experience of the Northern DO who has previously implemented solar PV projects and liaised with MERA approved contractors.

However, the as of yet unresolved issue of the quality of the batteries at the Health Clinic raises 2 important issues: firstly, the difficulty in ensuring contractors (even under warranty) are able to travel to remote area and undertake maintenance and secondly, the lack of quality standards at the national level for imported products means that it is probable some of the systems will fail early.

- **CEDP Project O&M Funds**

An analysis of the M&L data demonstrates that at 6 months all CBOs have generated income. However, as highlighted in the chapter on efficiency, of the 3 CBO business plans reviewed, only 1 is on track to hit its 9 month target. When compared to other similar projects, for example other solar PV systems in schools in Malawi<sup>47</sup>, an analysis of the data, suggests that raising income within the first 6 months is not the norm. Early results from the PV study indicate that,

- Economic performance is very weak. 11/16 systems had no revenue generation activity. Those that did, did not have substantial income for long-term asset replacement costs (i.e. station batteries after 3-5 years);
- Of the systems installed before 2011 - 65% were not meeting lighting expectations, and overall 38% of rooms with lighting were completely out of service;
- Community contributions of any kind to a project were almost unheard of; and,
- Project stakeholders did not meet regularly to discuss the project.

An example of good practice from CEDP projects is the role being played by chiefs in the community. 16 Chiefs surrounding Mikwala primary school, Ntchisi District, after realizing the importance of the project and its financial demands, mobilised their community members towards monthly financial contribution towards maintenance fund of the system. Each chief contributes K500 (a total of K8, 000.00) which mainly caters for the salaries of 2

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<sup>47</sup> MREAP Solar PV Sustainability Study

security guards at the school premises. Through this approach even if the income generating activities are not performing well on a particular month, security guards are assured of their salary and this has ensured maximum security at the school premises.

In conclusion, it appears that the CBOs are off to a good start generating income within the first 6 months. However a closer inspection of the monitoring data and the business plans suggests that the near to longer term view is not as healthy.

- **Readiness of local markets**

As the majority of CEDP installations have been solar PV, it is useful to take the example of replacing light bulbs to test the readiness of the market for the increase in demand. Currently, it is common for local markets to stock cheap low energy light bulbs for MK1000. Cheap brands however do not last long and require an inverter to work. This is an issue for some of CEDP schools who would like to buy the higher quality ones. High quality lightbulbs are DC light bulbs and cost MK6000 each. These bulbs last longer and can be used directly with solar without going through an inverter. So it means that even if there are problems with the inverter, lighting is still available.

Currently it is a concern that 10 lightbulbs are not working and have not been replaced. There will be various reasons for this (unable to buy lightbulbs locally, lack of high quality lightbulbs). For Likoma there is also the particular issue about distance to nearest seller and market on mainland. It is hoped that new and future demand for lightbulbs in remote, hard to reach areas, may trigger the creation of a local market for bulbs and other small parts.

The energy delivery model of CEDP is well-intentioned, embedding itself in remote inaccessible communities. However the geographical location of the projects further magnifies the challenges of sustainability. The communities need to be able to afford the premium for support and components to reach them given their distance from trading centres and it is not clear from the business models that this has been factored into the sustainability of the projects. Currently, as raised in the efficiency section the DOs have been supporting the communities to access their warranties and ‘transport’ parts to communities. While this further evidences the importance of CEM, the current insecurity of CEM’s future means that communities are very vulnerable to breakdown.

### *Solar lanterns*

From an analysis of FGD and key informant interviews, solar lanterns seem to be a sustainable method of introducing modern energy services to households for two reasons. Firstly, consistently across the data households are able to begin saving once they have paid off their loan for the lantern. A typical reduction in energy expenditure is K1,400 per week on candles (2 per day at a cost of K200) and dry cell batteries for torches (K400 for one). In addition, those households who were able to buy the more expensive lanterns with phone charging facility say they are saving around K700 per week on phone charging costs (and this does not include the transport costs to the nearest trading centre).

Two business models were adopted for the solar lantern social enterprise across the CEDP portfolio. In the Northern and Southern regions CBOs bought a small stock of lanterns to sell to local households by way of a short term loan repayable in instalments. In the Central region, the VSL model was adopted.



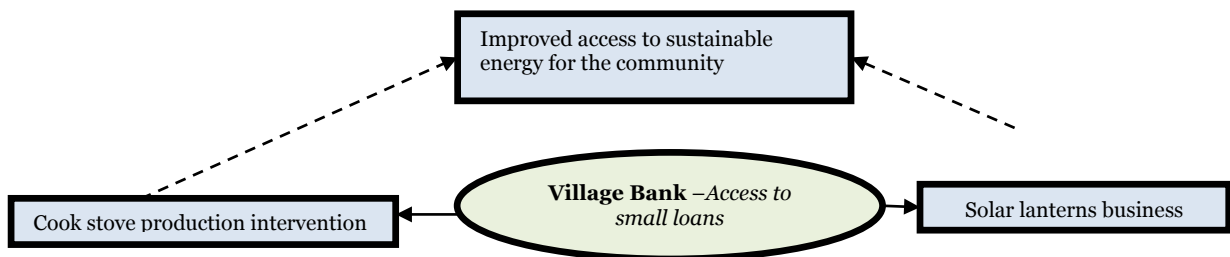
- **Village Bank, Dowa**

Mkanakufa village is an area located in the jurisdiction of TA Kaymebe in Dowa district, Central Malawi. 80% of people in the village are Tobacco farmers doing their farming in farmers clubs for companies such as Alliance One Tobacco company, and Limbe leaf Tobacco Company. Due to the nature of Tobacco farming the area faces massive deforestation because tobacco curing demands a lot of firewood, as such the area is heavily deforested.



As a result, women have been heavily affected by the effects of this malpractice because firewood, the primary energy source for cooking, has become scarce. However, fuelwood scarcity is no longer as much of a problem as it used to be. In Dowa district, the project has trained cookstove production groups in cook stove production, marketing, and business management. The project has also trained and established Village Savings and Loans (also known as village banks) to economically empower the stove production members to economically sustain cook stove production as a business. Above all the project provided solar lanterns to address the problem of lighting in the households.

Through the Village bank community members (who are members of the VSL group) are able to access energy loans/ 'small loans' which they use to purchase solar lanterns and cook stoves for their households'. (Please see the diagram below for a representation of the flow of funds). 80% of members of the VSL scheme are women. Access to small loans has enabled a number of women to venture into small business e.g. selling donuts, and hence has increased their economic empowerment. Women are then more able to contribute towards financial support for their households, repay their loans and through the VSL process support others to access funds. It is interesting to note that some unofficial VSL groups have emerged due to their admiration for what CEDP has done in their community.



The cook stove intervention is managed as a business whose proceeds are shared amongst the members who at the same time are members of the village banks. As such, the money circulates within the village bank as a central financial management unit for the stove production business. Through the loans provided by the village bank, the money gains interest which helps to boost the stove business and economically empower the members.



Furthermore, the village also acts as a central financial base for loans of solar lanterns specifically offered to the less privileged even if they are not members of the village bank.

An analysis of the 6 monthly CBO monitoring reports for solar lanterns points to the following key challenges to sustainability:

- Overwhelming demand for solar lanterns exceeding the supply from the CEDP grant.
- Repayment of the solar lanterns loan: Most of the community members took the CEDP granted lantern on loan with an initial payment of 50% of the total price of each gadget in question. However, finishing the remaining amount has been a problem, and this affected the lantern business.
- Some community members are not coming for phone charging mainly because some of the solar lanterns that were supplied have a phone charging facility. This has negatively affected the phone charging business. Despite this, most CBOs have additional income streams from video shows and barbershop, as well as contributions from learners and chiefs.

- **Critical learning from the solar lantern distribution suggests that**

- Management of the lanterns is best done by a local entrepreneur in the community unlike the current approach where the lanterns are managed by the CBO. Currently there are problems because some of the community members are failing to pay off their outstanding balances for the lanterns. This stems from the fact that people associate the CBO with charity work. Adopting a commercial model for CBOs takes time for people to believe and accept and therefore there is an impact on the lantern business. Many people thought the lanterns were a donation. As such there is a need for the CBO next time to engage an independent entity who will work on behalf of the CBO on issues of lanterns business.
- Remote CBOs find it difficult to access solar lanterns markets for buying new stock. Maukako CBO in the North has experienced difficulties replenishing its stock because the sunny money agent who is supposed to come to Nthalire (20km) doesn't always come, which means that the lanterns have to be bought from as far away as Karonga (220kms), which makes it expensive.
- CBOs need to anticipate the drop in income from charging mobile phones if households choose lanterns with charging stations. Be prepared and have a diversified income stream.

### *Cookstoves*

An analysis of the 6 monthly CBO monitoring reports for cookstoves suggests that the main challenges are:

- Low cook stove adoption rate in the initial stages of the project because this is a new technology in the community. However, the construction of the stove shelters has improved the situation because community members are able to get stoves to a place within community sight for selling.
- Defining the market for stoves. There have been problems marketing the stoves. CBOs have relied on the local market, customers drawn from within and neighbouring villages. However most of people in the CEDP communities are illiterate. It therefore takes a considerable amount of time for them to understand and adopt a new technology.

- Low cook stove adoption rate in the initial stages of the project, as most stoves were of poor quality (a central district experience). This was due to poor clay source which was identified during the initial stages of the project. However this problem has been rectified because the community has identified a good clay source and this is making more people buy the stoves.

For Chibothera CBO in the North of Malawi, the best thing that had happened in their area (as reported through the 6 monthly monitoring report) was the introduction of energy efficient cook stoves! Wood fuel is very expensive because the community has the Lake on one side and the hills, which are heavily deforested on the other side. This makes the people dependent on trees found in their gardens. These trees are bought at not less than a K1000 per tree. The person buying has to cut the tree and transport the wood to his/her home which is an extra expense. With the cook stoves now, households are saving money and time because they use less wood compared to 3 stone open way of cooking.

Cook stove production also empowered the women in the area since they take center stage in the production of the stoves. It is also a source of income for the producers because part of the proceeds goes to them directly. Stove production in general has created an extra occupation for the production members who initially could be left idle during tobacco growing off season.

- **Critical learning from the cookstove projects is**

- Carefully plan for and manage who the customers of the cookstove business are. Set aside funds for marketing.
- It takes time to introduce a new technology and get the product right. Support producer groups to get it right and build a cookstove shelter to place the product within the community's daily travels.

#### *Household and Office systems – solar PV on teachers' homes and CBO offices*

Systems have been installed on 50 teachers' houses and 3 CBO offices. The sustainability of these systems is linked to the sustainability of the institutional (school system). As highlighted in the efficiency section, currently 47 teachers pay a term fee for their electricity use at home. It is unclear if CBOs pay anything towards their electricity usage.

An analysis of the 6 monthly CBO monitoring reports suggest that a critical learning point is that in one region (Northern) it has not been possible to install solar PV on all teachers' homes and because of this animosity has developed between those who have and those who don't.

#### *Sustainability of CBOs*

A light touch review of the process of community entry/ access reveals some differences to standard NGO practice that could be considered sustaining and innovative:

- All CEDP projects used the CBO structure to manage projects. On other known projects the NGO's project manager manages the EMC. In the case of CEDP, CBOs were the project managers and conduit of funds. The DOs (a comparator to NGO project manager) took on the role of community facilitator.
- The CBO had to apply for funding and produce a business plan. A full needs assessment was carried out in each community, which helped shape the design of the technical solution, the application and the business plan. In other known projects, this level of detailed design happens once funding has already been approved.



- Each CBO received training on RET and business management training. All CBOs then produced a business plan which set out clearly how they proposed to generate income and sustain the systems. Financial processes were designed to support the monitoring of business plans. For example, when there has been a solar PV installation at an educational institution the School Management Committee has oversight of the income generation. The communities have a strong sense of ownership of the projects and a determination to make them sustainable. Nonetheless, consistently across all projects, there is a concern about the communities' ability to save enough for major repairs (e.g. battery replacement).
- CEDP put the focus on **community ownership of systems** after experiencing why other similar projects had failed elsewhere in Malawi. This was demonstrated through the emphasis on capacity building of the CBO and the creation of energy management committees, as well as **clarity of roles and responsibilities** between the CBO and the EMC on a range of potential issues that may arise. For example, when the TDC in Machinga had a problem with their charge controller, they spoke to the EMC, who solved it. However for larger problems the matter is referred to the CBO who contacts the contractor, for example, issues with the batteries in Machinga. The **learning journeys** were also another important factor in building ownership and understanding of sustainability.

However, until the DOs conducted the capacity needs assessments and began to work in earnest with the CBOs individually on their applications for funding from CES, the extent of their lack of capacity was unknown. It is unclear at this stage what capacity has been built in the CBOs and whether or not this is sustainable. An alternative model to consider would be using natural leaders within the community and using local NGOs as a conduit for finance.

The implication of these crucial differences is arguably a higher degree of community ownership of the process, the finances and the maintenance. It appears that there was an implicit understanding between the DOs that community agency and the principle of subsidiarity had to be the guiding principles of their facilitation.

The next section provides a detailed assessment of elements that support or detract from project sustainability.

## What elements are in place that support or detract from projects sustainability in practice?

To answer this question the evaluation team focused on two exercises: i) aggregating the evidence against different factors of sustainability; and ii) setting out the CEDP exit strategy.

- Factors of sustainability

Critical factors of sustainability include: quality control, roles and responsibilities, evidence of project ownership, project level revenue generation and business planning processes. An analysis of the evidence against each of these factors is set out below in Table 11.

By assessing the evidence<sup>48</sup> (second column where + depicts supporting and – represents detracting evidence) against the key factors (far left column) of project sustainability, it is possible to provide a judgement about whether at the 6 months point and there after, to the next major milestone between 3 and 5 years for component replacement the projects are: sustainable (green), showing signs of sustainability (amber) or showing signs of being unsustainable (red).

**Table 11: Sustainability Factor Analysis**

Factor	Evidence	6 month sustainability	Future sustainability
Quality control, supervision throughout the operations and maintenance (O&M) continuum (from design, through installation and maintenance, contracting, warranty).	<p><b>+Quality installations and MERA accreditation</b><sup>49</sup> hopefully means systems and cookstoves will last their average lifespan. However they are only 6 months young.</p> <p>- However, it remains that there could be an issue with <b>sub-standard quality parts</b><sup>50</sup>. While all attempts have been made to reduce this risk, the Malawian Bureau of Standards does not currently quality control all products on the market. Therefore it is possible that some of the components may fail early or need replacing post warranty.</p> <p>+ 33 solar lanterns and cookstoves have been returned and replaced under warranty. This demonstrates an understanding of the process.</p>	Green/Amber	Amber
Roles, responsibilities and organisational capacity for sustained operations and adequate maintenance.	<p>+ Overall there is a <b>positive trend of ownership and responsibility</b> within the communities visited.</p> <p>- However <b>capacity levels remain an issue</b>. Despite RET training, some in the energy committee are yet to understand why 'black-outs' happen ie overloading of system. There was demand for refresher training about how to take care of the system. Someone from the community needs to be able to diagnose the problem.</p> <p>+During the warranty period the <b>DOs have facilitated the relationship</b> between the contractor and the community/ CBO. This has built confidence and set-up communication between the community and the contractor.</p> <p>+DOs ability to work with communities and <b>resolve conflicts</b> has been central to the initial success of the projects. A good illustration of this skill is from the South when despite training and ongoing support, the CBO wanted to use the CEDP grant money for other things. The DO was able to explain and bring them round on a very sensitive issue.</p> <p>-However the fact remains that the community need to own this relationship and their <b>remoteness means that transport costs</b> to get the contractor to site need to be taken into consideration.</p>	Green	Amber
Evidence of initial and ongoing project acceptance/sup port/buy-in	<p><b>+The emphasis on community ownership</b> in CEDP projects means that there was a consistent experience across all projects reviewed of high project acceptance, ownership and understanding of what it takes to make the system sustainable.</p> <p>+There was also some <b>anecdotal evidence at the district level of district</b></p>	Green	Green

<sup>48</sup> To analyse the evidence, the evaluation team counted the number of '+' and the number of '-' and from this arrived at a generalisable judgement about the sustainability at 6 months. Then depending on the relative strength of the '-' count, the evaluation team arrived at a future sustainability traffic light.

<sup>49</sup> Please see annex 8 for an example accreditation which demonstrates how the installations were quality assured.

<sup>50</sup> The case of the Health Clinic in Machinga is one example of this. It appears that the batteries for the maternity wing may be faulty because they are never 'green' or fully charged. The contractor has looked at them and said they are ok but the experience (previous solar PV installation to run microscope) of the Health Manager says otherwise. He has raised it as an issue to the EMC.

Factor	Evidence	6 month sustainability	Future sustainability
<p>within the community and stakeholders.</p>	<p><b>stakeholders</b> looking at how to integrate the maintenance of these new systems into existing financial arrangements.</p> <p>+Currently <b>all schools have a watchperson/ security guard</b>. In most instances the village headperson has mobilised contributions from the community for the payment of the guard.</p> <p><b>+Relations between the CBO and key stakeholders have been very good</b> in most cases. One community member described the CBO as the “mother” of all development activity in an area. They are an existing and long term model used in Malawi.</p> <p>-Challenge is the <b>low ongoing capacity</b> and need for continual investment and support to build this to a sustainable level.</p> <p>+The general positive impact of solar lanterns on households because they are <b>saving money</b>.</p>		
<p>Project level revenue generation and financing of O&amp;M. Ability of projects to meet current savings targets to ensure long-term (5 year) financial sustainability.</p>	<p>+ All CBOs have developed a <b>business plan</b> that includes income generation to maintain the solar pv systems. For most a central pillar of the <b>social enterprise</b> is selling solar lanterns.</p> <p>- However, CBO business models have not projected income and costs based on installed <b>system’s lifecycle</b>. Therefore there are concerns about the visibility of what it takes to replace items after 5 years (batteries, charge controllers and inverters) and replace the solar panels after 25 years.</p> <p>+At 6 months <b>all projects have generated income</b> to contribute towards system maintenance. - However from developing lifecycle costing models for a small sample of projects visited, <b>only 1 out of 3 would be sustainable</b> in the long term. -CBOs need to <b>differentiate income generation</b>. Phone charging and/ or a barber shop cannot generate sufficient income alone to sustain the project.</p> <p>- <b>Lack of CBO monitoring balance sheet</b>. There needs to be continual monitoring against plan and lifecycle costing for all systems. With some CBOs choosing to sell solar lanterns with phone charging units, the numbers of customers has been lower than expected. Cannibalisation of markets is therefore a concern. This needs to be monitored, so that when the number of people charging their phones through the EMC structure is too few to make meaningful contribution, the EMC can diversify their income generation activities further.</p> <p>+ A few of the <b>EMC demonstrated entrepreneurial ‘spirit’</b> and had already starting thinking about alternative income generation strategies. These need to be supported. One EMC said that at the point they need to stop selling solar lanterns, they would look to increase capacity of the solar system so that they could power a fridge. Most dry and hot areas have a high demand for cold water and fizzy drinks, on which they could capitalise. A further SMC highlighted that for remote inaccessible schools, getting access to exam papers and copying them is a very real and timely issue that normally requires a teacher to be absent from school for several days as they go to collect and copy the papers. The SMC in Machinga would like to invest in a printer and photocopier which given its location (close to the TDC and Health Clinic) could provide an additional income generation stream as both these institutions require access to these facilities.</p> <p>+ There are <b>different business models</b> within CEDP portfolio. It is unclear at 6 months which are perhaps more sustainable than others. For example, the income generated from the sale of cookstoves goes back into the EMC’s maintenance fund for the solar pv system in Mzimba. Similarly in a small number of projects, cookstove sales and income generated from the sale of solar lanterns is being set-aside for the maintenance of the solar pv. In another district (Balaka), a village savings and loans scheme is being used to support lantern and cookstove purchase.</p> <p>- In general, the <b>marketing of stoves has been problematic</b> and this is a challenge to sustainability. Initial training has been given on marketing but further training is required to ensure that the production groups have the skills and confidence to link with supermarkets and other relevant markets.</p>	Amber	Red

Factor	Evidence	6 month sustainability	Future sustainability
Business planning process (including design, implementation and performance)	<p>+ <b>Business planning was conducted</b> and appraised at the design stage for each project</p> <p>+ <b>All CBO social enterprises are generating income.</b></p> <p>+ <b>CBO capacity has been built</b> to set-up and manage a social enterprise.</p> <p>+ <b>CEM is now officially recognised and registered</b> in Malawi.</p> <p>- However, <b>CEM does not currently have funding past March 2015</b> and at the 6 month mark it is <b>too early to judge whether or not the CBO social enterprises will ultimately be a success.</b> There has been no known reconciliation at the CBO project level, regional level or CEM level of the current performance against plan of the social enterprises.</p> <p>- The <b>incomplete and bad condition of some of the financial logbooks</b> suggests that it would be useful for the EMC to have refresher training on how to manage the finances at the community level, how to log expenditure and how to monitor progress against plan. The EMC needs to be as aware of financial 'red flags' as it is of maintenance issues.</p>	Amber/Red	Red

- CEDP exit strategy – sustainability of CEM

Late in 2013 a National Coordinator was hired for CEM. CEM was not officially recognised and registered as an NGO until January 2015. The idea of CEM was borne out of the need for ongoing support to CEDP projects. CBOs would become members of CEM and get access to top up help and support from organisation. The fees would enable CEM to deliver that support through the DOs. CEDP recognised that often it is the case that more help is required after systems are installed rather than before. Unfortunately CEM has secured no core funding currently to take forward its operating structure and employment of the DOs.

Currently there are 10 members comprising 2 Associate (Individuals) and 8 full Community Members. Associate members pay MK12, 000 in annual fees while full members pay MK6, 000 annual fees. Likoma CBO has registered with CEM at a cost of MK 6,000 on 14<sup>th</sup> August 2014 in order to access the on-going support. However without CEM and the DOs support the projects run a high risk of failure in the first year.

At the time of writing this report, CEM had not secured core funding for beyond the end of March 2015. On the 27<sup>th</sup> March 2015 the Board asked the employees of CEM if they were willing to work on a voluntary basis until funding was found. They agreed to this however it is unclear how support to the communities can continue without finance for travel.

## Risk Analysis of CBO management model

The following risk matrix identifies the risks associated with the CBO management model, implications for CEM, SG and GoM and then mitigation measures that could be taken.

There are 4 risks brought to the attention of the reader in this section. 3 of these are considered to be of high importance to the feasibility of the CBO management model. A common thread through each of these risks is the continuing operations of CEM and the process by which finance (in the form of support and guidance) will be allocated to CEDP projects (members of CEM). While classified as lower criticality, the ongoing involvement of District Officials in the remote inaccessible projects will provide minimal backstopping for the CBO should CEM exit.

Table 12: Risk Analysis

Problem/Risk	Criticality	Implication(s) / Dependencies	Mitigation/Prevention
Very low general capacity: illiterate, minimal project experience	<b>High</b>	Post installation of system a lot of support is required however MREAP is finishing. This means CBOs and EMCs are left to cope alone.	Source core funding for CEM and ensure CBO is member of CEM and provide appropriate level of support through regional DO.
Very low financial and project monitoring and management capacity	<b>High</b>	Post installation the reality for the CBO of running a/many social enterprises to support system maintenance could be overwhelming and reduce the medium term sustainability of the project.	Refresher financial management training for CBO and EMC that includes working up lifecycle models with the community so that they can work through how they will pay for components at 5 years (or before) and how then at 25 years they will replace the system.
Limited decentralised experience in energy to call on	<b>High</b>	CBOs will be isolated geographically and technically.	Source core funding for CEM and ensure CBO is member of CEM and provide appropriate level of support through regional DO.
Opposition from District Council	<b>Low</b>	CBO model did not provide allowances at District level for supervision of projects therefore there may be a lack of willingness to support CBOs.	When possible coordinate visits with District personnel so that they can understand and visit the project.

### Conclusion

Key factors demonstrating programme sustainability across the CEDP portfolio and approach are: strong quality control through MERA accredited contractors and inspectors; clear roles and responsibilities between CBO and EMC; strong emphasis from the start on building and sustaining community ownership; conducting business planning and starting small social enterprises (solar lantern sales and/or cookstove production) to generate income for O&M of main system; and crucially that all social enterprises are generating income at 6 months.

The analysis of system sustainability during the evaluation found that 93% of the total number of systems reviewed are functional. Questions remain however over the readiness of the local markets for the systems but at the household level people are already benefiting from increased lighting and improved energy efficiency.

- The cookstove producer groups' sustainability will depend on increasing adoption rates and rolling out appropriate marketing.
- Currently there are problems because some of the community members are failing to pay off their outstanding balances for the lanterns. Adopting a commercial model for CBOs takes time for people to accept, many people thought the lanterns were a donation. It also appears that management of the solar lanterns (i.e. social enterprise) may be best done by a local entrepreneur in the community.

However, it is the overwhelming vulnerability of CEM, with no core funding at present to take it past March 2015, which undermines all the gains in capital (as per sustainable livelihoods model). If core funding is not found then the analysis of lifecycle costs suggests that 2 out of 3 projects could fail before 3 years, all factors remaining equal.

## Innovation and Replicability

To close the findings, the evaluation team would like to draw the reader's attention to what it considers, in summary, to be the innovation in CEDP's approach.

- Social Enterprises - CBOs managing businesses

All 12 CBOs were trained in financial management and supported to develop a business plan to support the ongoing maintenance of the system. In each business plan the focus was put on income generation and as a result there is a strong trend of immediate income generation across all CEDP projects. Income generation in itself as a theme is not innovative however, the pace with which income was generated (ie all projects had raised income within the first 6 months) is innovative.

Furthermore the diversity of models used to develop social enterprises in the small CEDP portfolio and the 'community grown' nature of these models is innovative. From the transactional model developed in Chitipa, to the Village Loan and Savings Model championed in the central region. A strong social enterprise element has reinforced community ownership and a focus on maintenance. The dominant model of selling solar lanterns (after an initial subsidy to start the business off with 10 lanterns) has been a success and has generated household level savings. However, at 6 months it is too early to judge whether or not this will be continue to be a successful model to follow.

- Community Engagement Model - a high degree of community agency and subsidiarity

CES gave the DOs the freedom to support the communities' designs and decisions about which RET systems would work best for them. The DOs gave the communities power to choose the technology, which classrooms, which teachers' houses, how to set up the cookstove production group and so on. No stipulation was made by CES to the DOs for the number of projects, types of technologies to be used or indeed the model for O&M. This freedom to create is very empowering and has resulted in some strong project design and passionate responses to long forgotten remote communities. However it could be argued that the lack of a standardised approach to the social enterprise model or indeed the number of total projects in one region means that it is difficult to learn in earnest from these pilots projects without doing 46 individual project evaluations.

- *What could be replicated and then scaled up and/or out?*

At this early stage (6 months post commissioning of systems) it is too early to suggest what specific projects could be replicated. However in general, greater awareness of the benefits of RE at the community level would provide the social capital benefits experienced by the CEDP projects.

There has certainly been a cascade of interest in RE as a result of the community level projects. This cascade of knowledge and awareness filled a gap for many communities who, prior to CEDP, did not discuss energy. For example, in Dowa there had never been a meeting about energy prior to the DO visiting and setting one up in November 2013. In Chibothera community prior to CEDP there was no energy discussion within the Village Development Committee or Plan, and no specific energy committee. Now they have an EMC, a huge change in awareness and energy is discussed frequently. "Almost each and every HH would have solar systems" said a local EMC member.



# Summary Conclusions

The following table summarises the main conclusions by criteria from the findings sections.

	Summary
Relevance	<p>At 6 months an analysis of evidence suggests the CEDP projects have contributed to an improvement in quality and relevance of education and that over time this could lead to improvement in zonal level results. An analysis of DEPs provided evidence that CEDP projects are targeting the most vulnerable and underperforming schools.</p> <p>However, it appears that the process of engaging with District level officials in relevant sectors (health, education, social welfare) has been unsystematic. Where Primary Education Advisers have been engaged there has been a modest amount of influence on them, which in turn has supported an increased awareness of the benefits of energy.</p> <p>The lighting that CEDP solar pv installations have provided at schools has contributed to improvements in teacher wellbeing, as set out in the Teacher Retention Survey and Impact Report. Teachers consistently reported being happier to stay at the school they were deployed to because of the lighting and improved communications (charging of mobile phones locally).</p> <p>The capacity building approach of CEDP focused on building the business skills of the CBO. It was ambitious given the low capacity of the CBOs and the high levels of illiteracy. The CBOs did however play a legitimate and consistent role in building a strong sense of community ownership across the projects visited. Arguably however a less diverse portfolio would have freed up more time for increased community support and training.</p>
Efficiency	<p>At the project level an analysis of lifecycle cost modelling suggested that 1 in 3 projects would meet its 9 month target for income generation. Concerns remain over gaps in evidence found in the business plans and through the 3 Es Value for Money assessment. It therefore seems a fair assessment to state that each project requires ongoing financial stewardship and accountability to increase efficiency.</p> <p>The operational set-up and management of CEDP has changed over the course of 3 years. The push for the creation of CEM was to ensure better efficiency, sustainability and value for money of CEDP. So, the delayed registration of CEM did result in inefficiencies. Unfortunately, the current structure of the financial data does not allow for more detailed analysis at this time.</p>

Summary	
Sustainability	<p>Key factors demonstrating programme sustainability across the CEDP portfolio and approach are: strong quality control through MERA accredited contractors and inspectors; clear roles and responsibilities between CBO and EMC; strong emphasis from the start on building and sustaining community ownership; conducting business planning and starting small social enterprises (solar lantern sales and/or cookstove production) to generate income for O&amp;M of main system; and crucially that all social enterprises are generating income at 6 months.</p> <p>The analysis of system sustainability during the evaluation found that 93% of the total number of systems reviewed are functional. Questions remain however over the readiness of the local markets for the systems but at the household level people are already benefiting from increased lighting and improved energy efficiency.</p> <ul style="list-style-type: none"> <li>• The cookstove producer groups' sustainability will depend on increasing adoption rates and rolling out appropriate marketing.</li> <li>• Currently there are problems because some of the community members are failing to pay off their outstanding balances for the lanterns. Adopting a commercial model for CBOs takes time for people to accept, many people thought the lanterns were a donation. It also appears that management of the solar lanterns (i.e. social enterprise) may be best done by a local entrepreneur in the community.</li> </ul> <p>However, it is the overwhelming vulnerability of CEM, with no core funding at present to take it past March 2015, which undermines all the gains in capital (as per sustainable livelihoods model). If core funding is not found then the analysis of lifecycle costs suggests that 2 out of 3 projects could fail before 3 years, all factors remaining equal.</p>
Innovation and replicability	<p>Two key innovative features of CEDP were: i) CBOs managing social enterprises; and, ii) the model of Community Engagement which has a high degree of community agency and subsidiarity.</p> <p>At this early stage (6 months post commissioning of systems) it is possible to say that increasing awareness of the benefits of RE at the community level and using the CBO model to community engagement does appear to provide improvements in social capital at the community level.</p>

	Summary
Effectiveness & Results	<p>The diversity of the portfolio makes it difficult to judge effectiveness. MREAP was an action research grant that assumed a low level of local knowledge around modern energy services and their appropriateness to local community needs. To counteract this, CEDP spent 2 years dedicated to building community capacity and ownership. The key finding from a review of documentation, key informant interviews and focus groups discussions is however that there were three major risks associated with CES' approach that had to be mitigated. Firstly, CES' inexperience in planning and managing in a development context arguably led to too many sites being chosen without any<sup>51</sup> planning and/or management of the amount of total effort that would be required to work over the large geographical area for the budget and time available. The result for CES was much higher support costs than anticipated. These unanticipated costs were borne by CES solely.</p> <p>The second risk was at the <u>project level</u>. Arguably, a lack of planning and management could contribute to a reduction in the sustainability of project outputs and achievement of project outcomes. More time will need to pass before it is clear whether or not this is the case. However, it is the case that Development Officers were not able to spend as much time as required with communities because they were travelling so often between sites.</p> <p>The final risk was <u>internally to MREAP</u> from CEDP that the DOs and CES would not have the necessary time to dedicate to monitoring and supporting the roll out of tools associated with collecting and storing data. This was also the case and resulted in additional time being spent by IOD PARC and Strathclyde University to ensure data was collected and stored.</p> <p>In addition, at 6 months it is arguably too early to assess which interventions are most effective and whether CEDP projects and the CEDP approach are contributing to development outcomes. However an analysis of different types of capital (as expressed by the Sustainable Livelihoods Framework in terms of human, natural, financial, social and physical) points to comprehensive changes in human and social capital. CEDP projects have contributed to building human capital improvements in terms of health, education, knowledge and skills. Solar PV installations in educational institutions and solar water pumps have produced the greatest increase in social capital through improvements in trust, decision making and leadership. Solar PV installations and solar lanterns also increased the network and connection assets through mobile phone charging facilities. Cookstove projects singularly contributed to the increase in natural assets of forestry and both solar lanterns and cookstoves provided immediate benefits to levels of financial capital in terms of savings and access to credit.</p> <p><i>Results</i></p> <p>The CEPD portfolio is made up of 46 projects across 12 CBOs located in 12 districts across all regions of Malawi. The total number of beneficiaries of CEDP projects is 20,439. A total of 378 healthy babies were born at the single health clinic monitored by CEDP. CEDP has modestly supported the country's push for improved cookstoves nationwide by setting up producer groups and selling 325 cookstoves in the first 6 months. A total of 9 solar lantern social enterprises were set up by CBOs that sold 465 solar lanterns. All CBOs had generated income by 6 months and patterns in energy expenditure validated users paying for electricity and generating savings from solar lantern adoption. For educational attainment, the overall trend is that exam performance is very gradually improving in CEDP-targeted schools and that lighting does make a difference to teacher's job satisfaction.</p>

<sup>51</sup> Development Officers planned their work and submitted these workplans to CES. However, no documented evidence was found during the process evaluation for the total national plan being reconciled against actual budget/time available.

# Summary of Recommendations

Funding MREAP represented a step-change for the Scottish Government's International Development Division; it remains today the largest single grant that has been made. Between 2011 when the Scoping Study set the premise for MREAP, May 2012 when the programme officially began and its close in March 2015 the Scottish Government has changed its approach to monitoring and reporting against grants. MREAP embodies the Scottish Government's desire to learn more about what works and what doesn't with regards to: energy in development, deploying community managed renewable energy pilot projects, partnering with the Government of Malawi and providing evidence to influence policy.

The following recommendations are set out to specific stakeholders of the Renewable Energy sector in Malawi and are divided into two time periods: coming year (April to end December 2015) and 2016 onwards.

In the coming year, the following recommendations are made to **Community Energy Malawi**:

1. Rationalise the project portfolio to a manageable geography and size given restricted funds. Conduct a full handover to District of projects that are not included in new portfolio. Officially handover the cookstove projects to the National Taskforce on Cookstoves.
2. Work with the Primary Education Advisers and District Education Managers to monitor and report on change against the Monitoring & Learning Framework at one year from installation for all Community Energy Development Programme projects. Actively include District Executive Committee in the follow up with projects. Invite them to go on monitoring visits, explore ways of including Education Officers on trips to field.
3. Update the training needs assessments of the communities (Community Based Organisation and Energy Management Committee). Where are they now? What do they need? Place a strong emphasis on financial management and develop lifecycle costing models for all projects.
4. Train community members in technical repairs. Simple short term steps can be taken to train community members on how to use basic equipment like a voltmeter or ammeter so that they can test batteries before buying them. The lack of basic technical skills is a common gap in technology transfer projects that ultimately, if not dealt with, leads to a high level of system failure in the short term.

In the coming year, the following recommendations are made to the **Government of Malawi's Department of Energy**:

1. Support Community Energy Malawi to secure core funding so that the investment made by the Scottish Government is sustained. Use Community Energy Malawi as the voice of the community and the glue between the community and the district to learn about how off-grid community managed Renewable Energy projects can be included to increase the proportion of rural households with access to modern energy services. A first step would be asking Community Energy Malawi to manage the community consultation process for the new Energy Plan.
2. Fast-track the appointment of District Energy Officers to monitor and support the new Energy Plan and national policy directives.

3. Consider setting up a National Solar Lantern project that piggy backs on National Cookstove Programme structure. Research the benefits of ‘clustering’ the two technologies together.
4. Learn from the Development Officers use of MERA accredited contractors and set a national standard for all Renewable Energy Technology installations to use an accredited list and then use MERA has a means of inspection post-installation.
5. Ask MERA to report on number and quality of systems inspected. Begin to develop national level standards for Renewable Energy Technology components.

In the coming year, the following recommendations are made to the **Scottish Government**:

1. Draw out the lessons from this process evaluation and consider how they can be applied to the current portfolio of projects in Malawi;
2. Identify resources and develop a strategy/plan for the dissemination of key learning outputs from MREAP (e.g. process evaluation, Solar PV Sustainability Study, Energy Enables Review Paper). Be proactive in the dissemination of this process evaluation.
3. Actively and transparently communicate the findings of this evaluation to donors (e.g. EU, UNDP and UK Aid) who have previously expressed an interest in learning from MREAP.
4. Then build on the momentum of dissemination ‘for learning’ and position SG as a donor who does learn from its portfolio. Communicate with grantees (existing and future) how you have fed back in the learning from MREAP into your grant funding cycle.

In the coming year, the following recommendation is made to **Malawi’s donor partners** (UK AID, UNDP, World Bank, JICA) and other **external donors interested in the Renewable Energy sector in Malawi**:

1. Consider core funding Community Energy Malawi to provide a platform that can sustain the CEDP project portfolio and through which the community can voice their needs with regards to access to modern energy services and energy efficiency (cooking).

In the coming year, the following recommendations are made to **research institutions and/or INGOs in the energy sector in Malawi**:

1. Provide finance to go back and monitor Primary School Leaving Certificate results in schools with solar pv systems to generate evidence of whether there is an impact on results and the factors that contribute to this (improved quality and relevance of education through improved teacher retention, improved classroom facilities etc)
2. Generate more data on teacher retention and provide a richer picture of the nature of teaching in rural Malawi. What are the factors that are critical to retaining staff and meeting DEPs? Consider repeating the Teacher Retention Survey in October 2015.

From 2016 onwards, the following recommendation is made **to the Scottish Government**:

1. Commission an independent evaluation of MREAP.



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