MALAWI RURAL ELECTRIFICATION PROGRAMME (MAREP)

The Rural Electrification in Malawi is implemented under a number of projects both by Government, Cooperating Partners and the Private Sector. Overall, the Rural Electrification activities are implemented under the Malawi Rural Electrification Programme (MAREP).

Objective of MAREP

The objective of MAREP is to increase access to electricity for people in peri-urban and rural areas as part of Government's effort to reduce poverty, transform rural economies, and improve productivity and quality of social services. Implementation of MAREP is through extension of the electricity distribution grid to peri-urban and rural areas and construction of off-grid power systems e.g. solar home systems and mini-grids with power generation from various sources.

Implementation Modalities

In executing its functions, the Rural Electrification Unit in the Ministry of Energy adheres to the Rural Electrification Act and all relevant pieces of legislation including the energy laws promulgated in 2004, Public Finance Management Act, Public Audit Act and Public Procurement Act.

Subject to the approval of Rural Electrification Management Committee (REMAC), which is the Board mandated to oversee the implementation of MAREP, the Programme outsources various services e.g. construction of power lines and other works, supply of materials, surveying and supervision services. Selection of these outsourced goods and services is done competitively as required by public procurement laws and guidelines.

The Programme is implemented through grid extension and off-grid means such as Mini-grids and solar home systems depending on circumstances on the ground and existing policies. As a startup, Government had set up resources in the 2021/22 development budget to develop three mini-grids (Solar and Hydro) and provide 2000 Solar Home Systems to ultra-poor households which cannot manage to pay electricity bills which will include a colour TV set connected through decoders obtained from Malawi Digital Broadcasting Limited. These solutions are for free.

Controls

As required of any Treasury Fund, the Rural Electrification Fund is audited regularly. External audit services are provided by the National Audit Office who apart from the financial resource audits, also audits the performance outputs. In addition to external audit services, the Programme also has adequate internal controls including regular internal audits to safeguard the usage of material and finance resource. The Programme has been audited every year since its inception.

Source of Funding

Although the Rural Electrification Law indicates a number of sources of funding including budget subvention from Treasury, the only source has been from a levy on energy sales which is at 4.5%. With this development, the funding has not been adequate leading to variation in the number of sites electrified per phase including delays to implement successive phases in order to build the fund.

Government has set a target of at least 30% electrification rate to be achieved in the rural and peri-urban areas by 2030. To achieve this, at least 1000 sites need to be electrified per phase,

with phases being implemented within the financial year of implementation. In view of this, more funding is urgently required.

Development of the Rural Electrification Masterplan

As a matter of policy, all sites proposed for electrification are contained in the Rural Electrification Master Plan (REMP). These sites are submitted by the District Councils to ensure ownership, fairness and transparency. The procedure used is as follows:

(i) Identification of proposed sites should be done at village level through the Village Development Committee (VDC);

(ii) Proposed sites should be passed on to the Area Development Committee (ADC) for further endorsement;

(iii) Endorsed sites are passed on to the district level to be further endorsed by the District Executive Committee (DEC) and approved by the full Council.

This is done cognizant of the fact that the full Council comprises Members of Parliament for all district constituencies, all Councilors, all Traditional Authorities and the district secretariat. This way, the decision will be reached by all district representatives.

(iv) Sites approved by the Council should be submitted to the Ministry of Energy for inclusion in the REMP. It is required that submission of sites to the Ministry of Energy be authenticated to have been approved by the full Council by signatures of both the Council Chair and District Commissioner.

(v) Surveys are conducted on all submitted sites in order to determine the **existence of the sites, electricity**

demand of each site and **distance of each site** from the **existing electricity distribution grid.** The latter two parameters determine the position of each site in the district which helps to come up with the prioritised list of sites for each district as contained in the REMP. Sites with high priority are electrified first.

Sites proposed for electrification include economic activity areas (trading centres), villages and public institutions.

The Master Plan has a lifespan of five years before it can be updated, albeit taking into consideration the depletion of sites in a particular district in which case updating can be done after two years. According to the Rural Electrification Act (2004), approval of the REMP is done by REMAC.

The current REMP runs from 2020 to 2025. However, due to the imminent depletion of sites in some districts, the current REMP will be reviewed this year. To this effect, letters will be written to all districts to submit sites which may have been omitted in the previous submission to be included in the reviewed REMP.

Site Selection Procedure for Electrification in a Phase

Sites are electrified in a planned period called **Phase**. The total number of sites to be electrified in a particular phase depends on the availability of funds during the period of implementation of that phase. More sites are electrified with more funds available and vice versa. Below is the procedure to determine the number of sites to be electrified per district in a particular phase:

(i) A total number of sites to be electrified in a phase is determined by amount of available funds during the phase;
(ii) A base (equal) number of sites is determined for all the districts;

(iii) A remainder of sites from the total is shared across the districts based on Demography of each district.

It is observed that the higher the demography of the district, the more sites with high electricity demand will be and vice versa. It follows therefore that districts with high demography will have more sites to be electrified in a phase than districts with lower demography.

INITIATIVES TO SPUR QUICK GAINS

Power Connection to Public Institutions

Government will facilitate the wiring of public institutional buildings and connection of electricity. This is to ensure that electrification of the buildings, such as schools, hospitals and other Government institutions are electrified using the rural electrification Fund. The wiring of and connection of electricity to public institutions will be implemented from Phase 9.

Scheme for Low Income Households

Government has devised schemes for the Rural Electrification Fund to connect electricity to low income house-holds for equal provision of access to electricity. One such scheme is called Ndawala Initiative. Some of the low income house-holds to being targeted are those headed by female, children, disabled and the elderly. The beneficiaries selected for the scheme have their households wired under a soft loan at a subsidised cost of K64,075 which is interest free. Repayment of the loan is through 40% deduction from purchased units.

The normal cost for wiring similar households is K200,000 per household on average.

Ultra-Poor House-holds

Although low income households are assisted with wiring of households and removal of connection charge, a balance must be struck between low income consideration and ability to pay for electricity units once electricity is connected to the house. It is a fact that some households, classified as ultra-poor, will find it difficult to buy the electricity units due to inability to raise the required money. It is against this background that the Solar Home System (SHS) idea was hatched to provide electricity to Ultra-Poor households at no cost. SHS use naturally available sunlight to generate electricity through Photovoltaic (PV). In this way, the beneficiaries of the scheme will use free electricity the rest of their life so long the system is working. The system will consist of battery, solar panel, lighting and colour TV to be connected through Malawi Digital Broadcasting Limited decoders.

Maintenance of the systems will be covered by engineers in the Ministry of Energy.

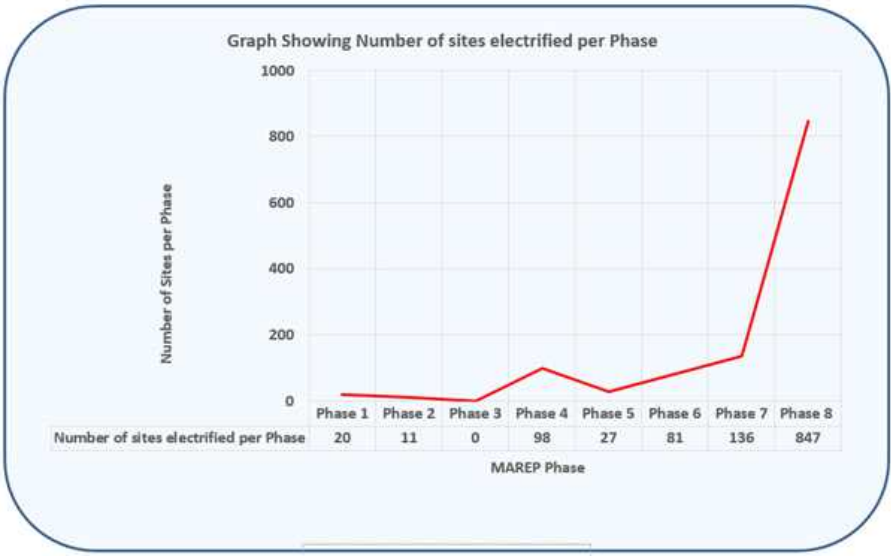
ACHIEVEMENTS OF MAREP SO FAR

Following are some of the achievements from the implementation of MAREP over the years.

i. Increased number of sites

Since its inception, MAREP has been electrifying sites in all districts of Malawi. In order to increase the electrification rate, more sites have been electrified especially in the later phases, though limited by availability of funds. More sites would be electrified if more funds were available. Phase 8 alone electrified 847 sites up from 136 sites which were electrified in Phase 7, presenting an increase of 523%. Phase 7 had the highest number of electrified sites before Phase 8.

The graph below shows the sites electrified over the phases.



ii. Increased Generation

The core activity of MAREP has been extension of the electricity distribution grid. However, considering the low power generation capacity the country has been experiencing, the Programme has also funded development of power generation plants as outlined below.

Wovwe Power Station

Under Phase 3, the Programme developed Wovwe Hydro Power Station along the Wovwe River in Karonga with funding from the Federal Republic of Germany. The Power Plant was commissioned in 1996 and is operating to date. The station contributes 4.5 Megawatts (MW) to the national grid and it has the capability of being operated as a standalone system which can supply power to Karonga and Chitipa districts.

Kapichira 2 Power Station

During Phase 6, some resources from the Programme amounting to US$55 Million were used to develop Kapichira II Hydro Power Station along Shire River in Chikwawa District. Kapichira II contributes 64.8 MW to the national grid and was officially commissioned on 17th January 2014. The power station was passed on to the Electricity Generation Company of Malawi (EGENCO) Limited following the unbundling of ESCOM Limited in January 2017.

Replacement of Diesel Gensets at Likoma and Chizumulu

Government is determined to find a lasting solution for the power deficiency in the country including in Likoma district. Likoma district is composed of Likoma and Chizumulu Islands. Due to their geographical position, overhead grid extension is not possible because of the significant distance between the mainland and the two Islands. Possibility is there to take the power cable under the lake (especially DC cable) to supply power from the mainland but the cost would be prohibitive to implement the project. In view of the aforesaid, these Islands were electrified through diesel powered stand-alone mini-grids through MAREP during implementation of MAREP Phase 4.

The Generators had operated for over 20 years in 2020 and in the process huge costs were being incurred through operation and maintenance of the system due to the aging and dilapidated state of the generators. Therefore, the Ministry decided to replace the ageing gen sets with funding from the Rural Electrification Fund under MAREP. This was in support of realization of a hybrid system with solar power generation which has been funded by EGENCO. The Solar power plant has capacity of 1MW for Likoma Island and 0.3MW capacity for Chizumulu Island while the Diesel Generators have capacity of 1.12MW and 0.64MW for Likoma and Chizumulu respectively. Replacement of the dilapidated diesel generator sets with supply

and installation of modern equipment has helped to reduce operating costs through improvement in engine efficiencies. Initially the installed capacity was 0.6MW in total.

iii. Mitigation against Deforestation

Increased rate of electrification is proving to be a significant step in the reduction of using charcoal and biomass in the rural areas. Although a lot of work has to be done to sensitise the people on the advantages of cooking using electricity on hotplates, other rural dwellers have already embraced the idea.

With robust and sustainable campaigns, a lot more people will be able move from using biomass for cooking and start using electricity. This will significantly reduce deforestation and its negative effects

SPEEDY CONNECTION OF HOUSEHOLDS WITH ELECTRICITY (NDAWALA INITIATIVE)

It has been observed over period that not all people connect to electricity when the network has been brought to a site. The main reason for non-connection is due to low income households not being able to pay for wiring of their premises at the time of electricity connections. To this effect, interventions have been put in place to assist the low income households to connect to electricity.

To ensure that a lot of households are connected to the grid, the Programme started implementing the Ndawala Initiative in May 2019 on pilot basis. The Initiative provides incentives such as wiring of customer installations using a soft loan agreement with no interest charged.

Connection of electricity to benefiting households under the initiative is for free, whereas households which are not under Ndawala Initiative pay a subsidised connection fee of K17,500. Repayment of the loan is through purchase of electricity units where 40% of the purchase is deducted to recover the loan. During MAREP Phase 8 alone, 11,325 households have been connected to electricity through the Ndawala Initiative.

Plans are already underway to connect more households under Phase 8 Extended where identification of beneficiaries is in progress. A total of 25,116 households will benefit from Ndawala Iniative. These are low income households which find it difficult to find money to pay contractors for wiring of their houses. The Initiative will be implemented in future phases as well.

Connection of Ultra-Poor Households with Electricity

Identification of deserving beneficiaries under Ndawala Initiative and Solar Home Systems for Ultra-Poor Households is under way, using transparent guidelines without any discrimination of any kind. For a start, 2000 beneficiaries will be targeted under Solar Home Systems for ultra-poor households while 25,116 will be targeted for low income households for sites electrified under Extended MAREP Phase 8. In total, 27,116 households will have their electricity connection to their houses for free.

IMPLEMENTATION OF MAREP PHASE 9

It is planned that a total of 575 sites will be electrified under MAREP Phase 9. The phase is being implemented in two sub-phases namely Sub-phases 1 and Sub-phase 2. This is due to limited financial resource availability. Otherwise, it would have been proper to electrify more than the total number of sites which were electrified under MAREP Phase 8 if financial resource were allowing.

The Ministry of Energy is in the process of implementing MAREP Phase 9 Sub-phase 1. Sub-phase 1 will cover a total of 345 sites across the country. The following activities have been completed under sub-phase 1:

i. Detailed designing of Medium Voltage power network and surveying of High Voltage power lines.
ii. Wayleave assessment around sites in 23 districts and compensation in 8 districts.

Procurement of electrical construction materials is underway with evaluation process of bids in progress.

Going forward, it is planned that as the manufacturing of materials is in progress after award of contracts, the process to procure contractors to construct the power lines will commence. The plan is supported by the fact that it takes approximately four months for the supply and delivery of materials to be done from the date of award of contract. Therefore, early procurement of contractors may bring complications through claims by construction contractors as a result of idle time.

Considering the estimated time before the supply contracts may be signed after going through all the processes, it is projected that construction of power lines will commence in September, 2022.

CHALLENGES IN IMPLEMENTING MAREP

In the midst of so many achievements following the implementation of MAREP, there are challenges along the way as indicated below.

i. *Pre-mature Failure of Transformers*

It has been observed that some of the installed transformers have failed before their life span has come to an end.

It should be pointed out that the failure of distribution transformers in Malawi are not only those which were procured under MAREP. This is a common problem which has also affected transformers procured by ESCOM.

Causes of Pre-mature failure of Transformers

An investigation was instituted to find out the high rate of pre-mature transformer failure in so many sites throughout the country. The following was established from the investigation:

a. Both MAREP and ESCOM sites have been affected by the pre—mature transformer failure.
b. The failure rate is high in the rainy season.
c. The failure rate is higher in rural areas as compared to urban areas.
d. Vandalism issues are higher in rural areas as compared to urban areas.

From the findings above, it would be safe to conclude that failure of transformers is mainly due to lightning strikes which burn the transformers. Both ESCOM and MAREP transformers have been affected by lightning strikes.

The effects of the lightning strikes are exacerbated by vandalism of both transformer and power line earthing material. The earthing material is susceptible to vandalism because it is made of copper which fetches high prices on the black market. When the earthing material is vandalized, the transformer is technically left without protection against voltage surges and it easily fails if there are such surges. A large number of transformers both under MAREP and ESCOM are failing due to vandalism of the earthing material.

It would be wise at this point to condemn the rampant vandalism of electrical materials which is happening all over the country. During the joint meeting of the SADC Ministers

responsible for Energy and Water which took place in Blantyre on 2nd December, 2021, it was highlighted that the problem of vandalism is common to the whole SADC region.

In certain cases, transformers have been vandalized by taking the whole transformer down from its holding structure and opening the inside to steal the copper windings. A few examples of such a case occurred at Ulaya Market and Lirangwe Trading Centre in Chiradzulu and Mpachika in Blantyre.

To address the vice, the following has been planned:

a. Engage the communities and leadership to sensitive them on the need to own the projects;
b. Deploy drones to monitor the infrastructure from time to time to deter the vandals.
c. Explore the use of different material for earthing as opposed to copper which fetches good prices on the market; and
d. Use the coloured and smelly oil to give reaction to the general public in case of consumption.

ii. *Sparse Settlement Patterns*

Settlement patterns for the country make it difficult to implement the Programme by using grid-extension through out. To address this, off-grid solutions in form of Solar Home Systems will be deployed in areas which are sparsely populated.

iii. *Limited power generation capacity which affects power availability.*
iv. *Lack of enough financial resources visa-vis the total number of sites to be energized per phase including Ndawala Initiative and connection of public institutions;*
v. *Given the vast scope of work to implement MAREP,*

there is need for more human resource in the Rural Electrification Unit than it is the case now. The high vacancy rate is complicating the situation.

To address the aforementioned challenges, the following is being implemented:

i. increased and diversified power generation sources;
ii. establishment of the Rural Electrification Agency (REA) to unlock funding to supplement the existing modality of funding from levy on energy sales. Further, the Agency will remove bureaucracies existing in the current set up to obtain the appropriate human resource;

iii. sensitization of the rural communities and leadership to embrace rural electrification projects as their own and guard them against vandalism;
iv. deployment of off-grid solutions in form of Solar Home Systems (SHS) and Mini-grids to address the complications of supplying electricity to sparsely populated areas.

BOARD MEMBERS OF MAREP

1. Secretary for Energy - Chairperson
2. Secretary to Treasury - Member
3. Secretary for Local Government - Member
4. Malawi Engineering Institution - Member
5. Institute of Chartered Accountants in Malawi -Member
6. Chief Executive of MERA - Member
7. Director of Energy -Member

The board is supported by two sub-committees namely:
1. Technical Sub-commitee; and
2. Finance & Logistics Sub-commitee.

Both the Board and Sub-commitees meet once every quarter of the year.

SECRETARIAT

Rural Electrification Unit in the Ministry of Energy is the secretariat for the Board.

Head of Secretariat
The secretariat is headed by the Deputy Director of Energy responsible for Rural Electrification, who coordinates the rural electrification activities in Malawi.