Energy and Economic Growth
Applied Research Programme

Impacts and Coping Mechanisms for the Covid-19 Pandemic in Malawi's Energy Sector

Workshop Report

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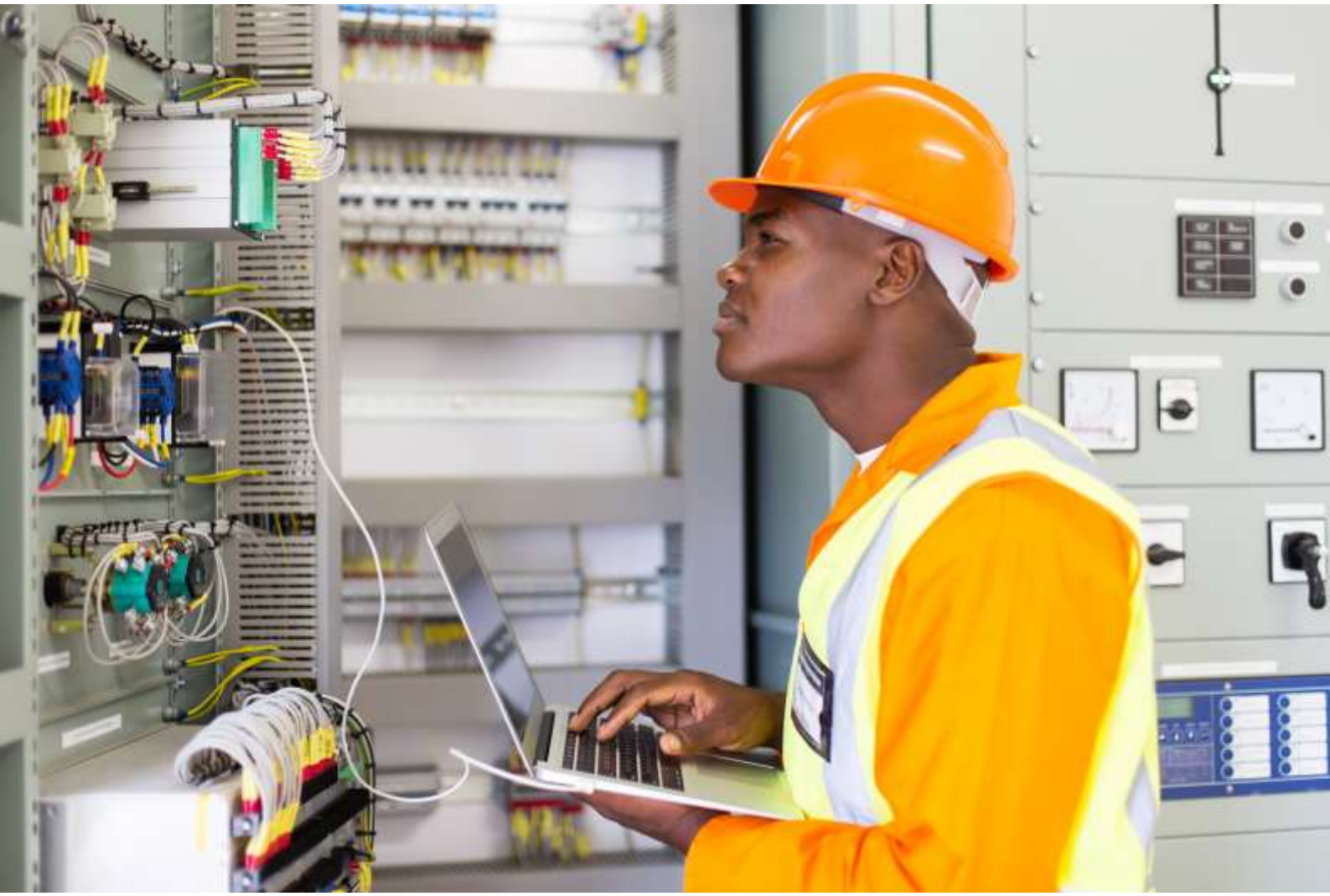

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1.0 Introduction

Energy is critical to managing the COVID-19 pandemic. Energy in the form of electricity is needed for the operation of ventilators and other medical equipment in the hospitals treating COVID-19 patients. Electronic transactions are needed for banking and commerce in light of social distancing measures. Electric-based information technologies are required for communication between governments and citizens, and between doctors and patients. And energy in multiple different forms is needed to meet households' energy needs, especially considering that with the pandemic people are required to stay, and frequently work, from home.

It is expected of the energy systems and infrastructure that are crucial for modern life that they be resilient to natural disasters and other unintended occurrences and risks. However, the scale of the COVID-19[1] pandemic, which has affected all of the world's countries at the same time, is a test to the resilience of energy systems globally.

This paper presents the results of two EEG-funded online workshops hosted by Mzuzu University on the impact of COVID-19 on Malawi's energy sector, and the coping mechanisms employed by the various stakeholders within the sector. Malawi, as at the end of June 2020, had recorded about 1,200 cases of COVID-19 and 13 deaths (Ministry of Health, 2020).

The public health policy measures taken to prevent the spread of COVID-19 in Malawi present significant challenges to electricity supply (Smith, 2020).[2] Preventive measures call for strict behavioural change, which makes working and social interactions that happen in a work environment difficult and challenging to manage (Ozili, 2020). People whose professional fields are not considered essential are required to be confined in and manage their work from home while observing social distancing and strict hygiene measures. Those allowed to go to work can only do so in very small groups. These requirements can increase the operations costs in a number of business sectors and cause businesses to stand still.

The preventive measures also have potential to increase the operational costs of energy service delivery and affect future capital structures (Laing, 2020). At a household level, staying in and working from home has resulted in increases in energy consumption thereby increasing energy bills at a time of dwindling household income as a result of scaled-down operations of businesses and loss of employment in some sectors of the economy. Additionally, induced shutdowns, whether voluntary or imposed, can bring complications to the supply chain management of traditional biomass, which contributes 83% of Malawi's energy mix.

It is, therefore, important to understand how the energy sector in Malawi is coping with the crisis and what lessons can be learnt for future energy systems management planning. Section 2.0 of this report further outlines the objectives of the two workshops held by Mzuzu University. Section 3.0 presents the results and Section 4.0 concludes with recommendations on steps that can be taken to enhance the resilience of Malawi's energy system to cope with future shocks and stresses such as the COVID-19 pandemic.

2.0 Research objectives and methodology

> "*Resilience is the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions* (Sharifi & Yamagata, 2016; Flynn, 2018)."

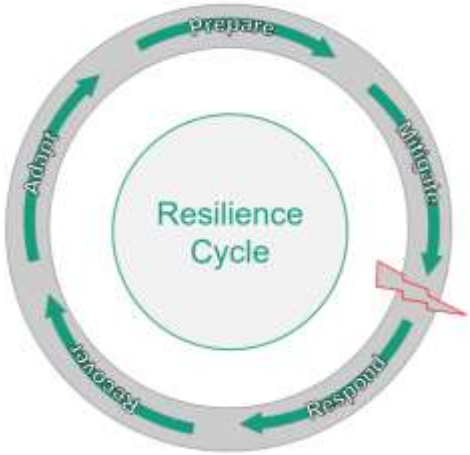
Resilience-centric approaches for systems and service delivery build in "planning and preparing for", "absorbing", "recovering from", and "adapting" to any adverse events that may happen in the future (Sharifi & Yamagata, 2016). The resilience circle in **Error! Reference source not found.** is a summary of actions that are

[1] COVID-19 was classified as a pandemic by the World Health Organization (WHO) on 11 March 2020. By the end of June 2020, the disease had spread to 216 countries and territories infecting about 10 million and killing about 500,000 people worldwide (WHO, 2020).

[2] The containment and preventative measures adopted in Malawi include 14 days' quarantine / self-isolation measures for those traveling into the country, working from home, frequent washing of hands with soap or use of alcohol hand sanitiser, social distancing, and investment in COVID-19 personal protective equipment (PPE) for workers.

inherent to a resilient system. The resilience cycle practice requires putting up measures before, during, and after a vulnerability context.

Figure 1: Resilience cycle



Source: Flynn (2018)

This research is intended to unpack the impact of COVID-19 on the energy sector in Malawi and outline future approaches for enhancing energy systems resilience. Specifically, the project set out the following objectives:

i. **Analyse the impacts of COVID-19 on the energy sector in Malawi**

- How has COVID-19 affected operations costs for energy systems?
- How has COVID-19 impacted early-stage energy projects and delays in project development and construction, and what are the implications for the country's energy outlook?
- Which areas require a stimulus package to contain the costs of energy systems delivery and prevent disruption of essential services amid the COVID-19 pandemic?

ii. **Examine the options for meeting energy needs in light of the dictates for preventing COVID-19**

- What are the stakeholder responses to COVID-19 in the energy sector?
- Are onsite/backup (decentralised) energy systems for medical care facilities helpful for managing the impacts of COVID-19 in the energy sector?
- What are the challenges and solutions regarding digital payments, particularly when purchasing electricity units?

iii. **Draw lessons for enhancing energy systems resilience**

- What is the state of third-party service providers such as banks and mobile network operators and how can they enhance preparedness and continuity of operations in the energy sector?
- What are the implications of COVID-19 for the energy policy and legal frameworks?
- What lessons can we take forward from COVID-19 in order to enhance energy systems resilience?

To gather information on how COVID-19 is impacting Malawi's energy sector, and how energy sector stakeholders are coping with these challenges, Mzuzu University hosted two online workshops via Zoom. Participants were purposively selected to ensure representation of the key players in Malawi's energy sector. In total, 19 of 24 invited participants joined the workshop, including policymakers and representatives of regulatory bodies, national grid operators (generation and distribution), off-grid energy technology suppliers, development agencies, bankers, and representatives of professional bodies, civil society, and women's rights bodies (a full list of participants is attached in Appendix 1). Stakeholders made presentations, which were

followed by plenary discussions from all participants highlighting individual experiences and lessons learnt. Summary overviews are presented in the following section.

3.0 Findings and discussion

The findings of the two workshops are presented in a framework that is aligned to the research questions and resilience circle outlined in Section 0, and are drawn from the experiences of COVID-19 by stakeholders in the Malawi energy sector.

3.1 Impacts of Covid-19 on the energy sector in Malawi

3.1.1 Impacts of COVID-19 on operational costs for energy systems

Data collected in this research indicate that COVID-19 increased the operational costs of energy systems for the following reasons:

- Provision of PPE and other COVID-19 containment measures such as masks, hand sanitisers, and regular disinfecting of shared machines such as cars and office computers. These were not planned or budgeted for by the power utility companies and mini-grid operators in their annual O&M budgets.
- Demand for risk allowances by employees for working in environments that exposed them to risks of COVID-19, such as fault clearing in households' premises, offices and the distribution network. Employees of power utility companies and mini-grid operators organised sit-ins and strikes to demand improvements in the conditions of service that would reflect the risks emanating from COVID-19 and which consequently affected the revenue of companies.
- Reduction in the number of employees travelling in one vehicle while undertaking routine work-related activities as a means to observe social distance. This led to an increase in the number of vehicles used per activity (e.g. fault clearing). The increase in the number of vehicles used per activity resulted in higher fuel consumption and therefore costs for the faults and maintenance activities budget lines. In terms of vulnerability context, Sadati *et al.* (2020) and Wilder-Smith and Freedman (2020) have argued that the COVID-19 containment measures may not be effective in curbing the spread of coronavirus and could lead to inadvertent consequences. In the case of the power utility companies in Malawi, increases in O&M costs, which have reduced the profitability of power utility companies, may in the long run affect energy services delivery, which in turn may compromise the fight against the pandemic that itself needs energy inputs.
- The doubling in the number of consultants used due to the hiring of local consultants to install energy systems components as a result of travel restrictions imposed on expatriate consultants who had initially been contracted to carry out installation of the Integrated System for User Interface.
- Employment of alternative measures to conduct community sensitisation, training, and civic education activities to raise awareness of mini-grid projects and safety issues in place of face-to-face meetings. For instance, the mini-grid developer United Purpose resorted to using a public address system at night instead of face-to-face daytime workshops. To ensure the security of staff operating the public address system at night the mini-grid developer hired police services to provide security for staff, which increased the project cost.

3.1.2 Impact of COVID-19 on early-stage energy projects' development and construction, and the implications for the country's energy outlook

The travel restrictions implemented as a result of the COVID-19 pandemic negatively affected the importation of energy equipment and components into Malawi. As a result, electrical supplies including cables and renewable energy products (especially solar batteries and solar water heaters) became scarce in Malawi. Traders that had stocks of the products imported before the travel restrictions increased the prices of these products within the dictates of the demand-and-supply hypothesis. Suppliers with renewable energy technology products in stock doubled the prices, taking advantage of high demand and low supply.

The scarcity of the equipment required for implementation of energy projects resulted in the following:

- Maintenance works on the grid distribution network and connections of new energy customers in Malawi were affected due to a lack of essential materials such as conductors for Medium Voltage and Low Voltage installations. Furthermore, power utility companies' response to faults dwindled as a result of working in smaller shifts of fault-clearing staff teams so as to comply with restrictions on the number of staff per grouping.
- The construction of a 300 kW hydro-based mini-grid at Usingini was delayed because the project developer was unable to import the required goods and services for the project.
- Maintenance works on two turbines at Kapichira hydropower plant, with a total generation capacity of 64 MW, were delayed as spare parts could not be imported and the expatriate engineers contracted to carry out the maintenance could not travel owing to the travel restrictions. This delayed maintenance led to the loss of 64 MW on the national grid.
- The development of a 300 MW hydropower project at Mpatamanga, which is at the planning stage, has also been delayed.
- Construction works of 120 MW, in total, solicited grid-connected solar PV projects at Golomoti, and Nanjoka in Salima and Nkhotakota respectively were suspended as the equipment could not be shipped into Malawi. For instance, equipment such as solar panels, batteries and invertors for both the Nanjoka and Nkhotakota solar farms were imported from China and were scheduled for commissioning in July and December 2020 respectively. However, the equipment could not be shipped due to the effect of the coronavirus in China.
- Developers of energy projects, such as Independent Power Producers, have not been able to comply with deadlines for equipment installation. This has in turn delayed project commissioning.
- Energy projects funded by supporting partners such as the World Bank – including the Malawi Electricity Access Project – have been delayed as the implementing officers could not travel to Malawi. If it had been implemented on time, this project could have increased access to modern energy to most households, health facilities, schools, water pumping stations, and enterprises in the country.
- The development, commencement, assessments, and implementation of an energy access project supported by the United Nations Development Programme (UNDP) in partnership with the Department of Energy Affairs of the Malawi Government have been delayed.
- On Liquid Fuels and Gas (LFG), it was found out that the volume of fuels imported into Malawi by the National Oil Company and Petroleum Importers Limited reduced due to a drop in oil demand largely caused by travel restrictions and reduced production by manufacturing companies. The reduction in volumes imported and sold in the country had a negative impact on the fuel levies that are collected and used for the Malawi Rural Electrification Program (MAREP) Roads Administration Fund. The impact on funding for MAREP, which is extending the grid to electrify rural trading centres and/or market places in a phased manner, consequently affected energy access in Malawi.

Given the abovementioned delays in the implementation and commissioning of energy projects, and if a similar situation or vulnerability context continues, it may be difficult for Malawi to achieve its energy mix targets, which are intended to ensure energy security and reliability of supply. The Government of Malawi intends to reduce biomass energy consumption to about 44% by 2025, increase electricity consumption from renewables such as solar to about 23% by 2025, and increase grid access to 30% by 2030 (Malawi Government, 2018; Malawi Government , 2017).

3.1.3 Areas that require stimulus packages to contain the costs of energy systems delivery and prevent the disruption of essential services amid the COVID-19 pandemic

Data collected from stakeholders show that the electricity supply companies, including off-grid players, needed financial support owing to the following reasons:

- Electricity demand has dropped due to the confinement measures as most sectors of the economy are operating skeleton crews and customer liquidity has gone down. The pandemic has thus caused electricity demand to fall as industrial electricity consumption holds the largest share in Malawi electricity consumption. Public institutions, such as boarding schools, have also shut down, again resulting in a reduced demand for electricity.
- Retailing of electricity units has gone down as most families with informal income sources do not have the resources to buy electricity units while staying at home, forcing that most families on post-paid to opt for defaulting on electricity bills. This stratum of stakeholders requires rescue packages in the form of reduced tariffs to lessen the burden of accumulated bills.
- Business operations have scaled down such that productive use of energy from mini-grids, notably among welding and carpentry businesses, is consuming less energy. This reduced energy consumption by mini-grids' anchor customers is a big threat to the sustainability of mini-grids.
- The COVID-19 pandemic has affected the revenue of the Electricity Supply Corporation of Malawi (ESCOM). The pandemic has led manufacturing companies to request that ESCOM reduce their Maximum Demand charge owing to the scaled-down production and operations. Industrial and commercial customers account for 80% of ESCOM revenue, with domestic customers accounting for just 20%. As a result, energy utility companies require subsidies to cushion the losses, which have increased as they implement the required COVID-19 containment measures.

It was also observed that frequent washing of hands as a measure to prevent the spread of COVID-19 had increased water bills for households. Therefore, the power utility companies needed to consider reducing tariffs for water supply companies, which in turn could be passed on to households as a way of reducing their water bills.

Stakeholders also expressed the need to support the off-grid sector due to the following:

- Demand for off-grid systems increased as a result of the need to electrify COVID-19 isolation centres and rural health centres. Notable examples included basic electricity for remote COVID-19 quarantine and treatment centres and demand for refrigeration of vaccines and other medicines in rural healthcare facilities that are not connected to grid electricity. These facilities lack both the power and equipment to provide cold storage. In addition, there is increased need for communication and information on COVID-19, which has led to an increase in electricity demand for charging those appliances used for communication.
- Demand for fuelwood in the form of firewood and charcoal increased in the household sector as most people were staying and working from home. This accelerated the rate of deforestation. For example, it was observed that the catchment area for Lichenya River in Mulanje Mountain, which supplies water for the 220 kW micro-hydropower mini-grid system for Mulanje Energy Generation Company, had suffered extensive deforestation during the coronavirus period. Law enforcement agencies were working below capacity following orders to work from home at a time when there was increased demand for fuelwood. It was also observed that staying at home presented a burden on women in terms of cooking and increased the rate of fetching of fuelwood.

Specific financial support was suggested as follows:

- A financial package to reduce the retail price of Liquefied Petroleum Gas, which has the potential to substitute biomass as energy for cooking at the household level in Malawi. This would also have health benefits as it has the potential to reduce exposure to smoke from biomass fuel and indoor air pollution, which cause respiratory diseases that can exacerbate respiratory problems caused by COVID-19.
- A financial package to reduce electricity tariffs. With people confined to their homes, resorting to teleworking and e-commerce shopping, families need support to buy electricity.
- A financial package to support a tax and duty waiver on electrical supplies to energy sector players.

3.2 Options for meeting energy needs in light of the dictates for preventing COVID-19

In order to ensure that the energy needs of different consumers are still met, the energy sector players in Malawi highlighted a number of adaptation and coping mechanisms, which are outlined in the following sections.

3.2.1 Stakeholder responses to COVID-19 in the energy sector

Stakeholders have responded to the COVID-19 pandemic as follows:

- Provision of sanitation supplies such as hand sanitisers, as well as regular disinfection of shared machines such as cars and office computers.
- Changing the mode of working from full time to working in shifts per day or per week in order to comply with social distancing measures.
- Reducing the number of officers travelling in cars to ensure social distancing.
- Suspension of new electricity connections.
- Suspension of all power distribution network projects (e.g. installation of transformers and distribution lines as equipment is stuck at the border due to travel restrictions and the skyrocketing prices of equipment amid the pandemic).
- Intensification of awareness campaigns for households on the benefits of purchasing electricity units using digital payments rather than queuing at electricity utility offices.
- Promotion of the use of energy efficient technologies such as LEDs to help households reduce energy costs and reduce pressure on the grid in order to prevent load shedding, which can impact on essential services.

3.2.2 The role of onsite/backup (decentralised) energy systems for medical care facilities in managing the impacts of COVID-19 in the energy sector

It was observed that COVID-19 had underscored the need for reliable electricity supply in healthcare facilities. As highlighted in Section 0, demand for off-grid systems increased for basic electricity for remote COVID-19 quarantine and treatment centres among other electricity needs. Of particular note was that reliable and uninterruptible power was required in COVID-19 testing sites because whenever there was an interruption in power supply at the testing facility, all the samples collected had to be disposed of and the sample collection process had to start all over again, which was a very painful process for the individuals being tested. Therefore, in order to ensure reliable power supply to healthcare facilities, the Ministry of Health initiated procurement of power backup generators and solar systems for distribution to treatment, isolation, screening, and testing centres.

It was also observed that within the three categories in which the Malawi health sector is categorised (community hospital level, district hospital level, and central or tertiary hospital level), community hospitals – also known as health centres – rely mainly on solar off-grid energy systems. District and tertiary hospitals rely on grid electricity as the main power supply with some hospitals having solar backup or diesel generators. However, some COVID-19 isolation sites do not have any power supply source. At the time of this study, there were seven COVID-19 isolations centres in Malawi: Karonga District Hospital, Mchinji District Hospital, Kameza, Mwanza District Hospital, Mzimba South, Mangochi District Hospital, and Chitipa District Hospital. There were also three treatment sites: Kamuzu Central Hospital, Zomba Central Hospital, and Mzuzu Central Hospital. All these sites require uninterrupted power supply to manage the COVID-19 pandemic in Malawi.

3.2.3 Challenges and solutions for digital payments and the state of third-party service providers in regard to enhancing preparedness and continuity of operations of the energy sector

Digital payments have the potential to decongest energy services' pay points, such as points for the purchasing of electricity units, thereby promoting social distancing. However, the stakeholders that participated in the research observed that:

- Challenges regarding electronic payments systems in Malawi deterred people from using the electronic platforms to pay for energy services.

- Mobile networks and banks take too long to resolve and make refunds on failed transactions toward bill payments and prepayment of electricity units.
- Electronic payment platforms are also frequently unavailable when needed, due to mobile and internet network challenges.
- Power-outages also render third-party vending of electricity units unreliable or unavailable as mobile network providers and banks rely on power availability for efficient digital payments and transactions.

3.3 Lessons for enhancing energy systems resilience

According to Chinazzi *et al*. (2020), early detection and isolation measures have been highlighted as effective approaches to enhance resilience and reduce the transmission of coronavirus. As observed in the resilience cycle presented in Section 1.0, to build and promote resilience it is necessary to implement measures before, during, and after a vulnerability context. In line with the research questions and stakeholder discussions, the following lessons were drawn.

3.3.1 Implications of COVID-19 for the energy policy and legal frameworks

It was observed that the current energy policy and legal frameworks are inadequate for enabling electricity tariff restructuring amid a vulnerability context that affects the revenue streams of both consumers and electricity suppliers. The LFG subsector benefited from automatic fuel pricing mechanisms in which the reduction of crude oil prices was passed on to consumers in Malawi. The challenge with the electricity tariff structure amid COVID-19 is that electricity suppliers have been faced with increasing operational costs, which needed to be passed on to consumers. Also, electricity consumers are faced with reduced revenue streams and increased household expenses including energy, which needed relief through a social safety net. This research found that the energy policy and legal framework needs further review to make provisions for cushioning both electricity suppliers and consumers amid vulnerability contexts similar to COVID-19.

3.3.2 Lessons from COVID-19 to enhance energy systems resilience

The following lessons have been learnt by energy sector stakeholders from the COVID-19 experience:

- Electronic transactions are essential for enhancing payments and therefore revenue collection.
- Bulk ordering and warehousing of essential materials and equipment to last for several months is crucial for reducing the vulnerability of the energy sector to natural events such as COVID-19.
- Local capacity in terms of both human resources and the production of essential materials is crucial to enhancing the resilience of the energy sector. The lockdown and travel restrictions made it impossible for expatriate professionals to travel to Malawi and presented challenges regarding the importation of essential goods for energy projects. The pandemic has therefore been a wakeup call to fast-track local capacity building among different professionals, including energy sector practitioners.
- Preparedness based on quick information gathering and responsiveness is essential. The evidence suggests that no institution in Malawi appeared to be putting measures in place when COVID-19 was announced in China.

4.0 Conclusion and recommendations

The COVID-19 pandemic has significantly and negatively affected the Malawi energy sector in terms of the development of energy projects, the supply chain of materials, and energy service delivery due to the implementation of travel restrictions, social distancing, and sanitisation as mitigation measures to the spread of coronavirus. Revenue from energy sales has decreased while operational costs have increased. Efforts to increase access to clean, affordable, and sustainable energy have been hindered, which has negative implications regarding the attainment of Sustainable Development Goal 7 and hence Sustainable Energy for All by 2030. COVID-19 has also underscored the importance of reliable energy supplies to support healthcare facilities in the country.

It has been observed that the Malawi energy sector is not prepared to deal with a vulnerability context that requires the localisation of actions and solutions. The coping mechanisms that have been put in place are short term; however, long-term strategies for the enhancement of Malawi's energy sector are required.

Given the findings and the discussion above, the following recommendations are made:

a) The Ministry of Energy should start energy scenario planning over five- or 10-year time periods, including other hazards such as droughts, and finding suggested solutions in advance. For instance, there needs to be a focus on scenarios where there is a pandemic that lasts five years or more or where the country faces drought for many years (considering that Malawi relies heavily on hydropower plants). This will help the country to come up with solutions in advance, and in so doing boost its preparedness.

b) The Ministry of Energy should liaise with the Ministry of Trade and Industry to support local companies in local manufacturing of essential electrical supplies to ensure an uninterrupted supply chain. This could include, for example, companies and organisations that are producing PPE locally.

c) The Ministry of Energy should liaise with the Ministry of Labour and Manpower Development, as well as professional bodies such as the Malawi Institution of Engineers and the Renewable Energy Industry Association, and implement local skills development programmes for the energy sector.

d) The Reserve Bank should enforce strict compliance to customer complaints resolutions for electronic payments so that customers are able to pay for energy services electronically. Electronic payments have the potential to reduce queues and congestion at points of sales of electricity units and other energy services, which in turn can promote social distancing and thereby reduce the transmission of COVID-19.

e) The Government of Malawi should construct more fuel reserves to increase storage capacity and to avoid any standstills in the future when situations constraining travel and importation recur.

f) Policymakers must put together recovery measures that are forward and outward looking, beyond market-driven approaches, and explore innovative approaches to secure financing amid crisis at foreseeable scales and reasonable speed. This can be achieved through a coherent design approach that needs to ensure inclusiveness, evidence from past situations, and secure political buy-in.

These approaches can promote resilience in the systems and service delivery of the energy sector, meaning it is better able to cope with the adverse effects of the COVID-19 pandemic and other such events. It is imperative that the lessons learnt from the COVID-19 pandemic are used by energy systems planners and designers such that they build in mechanisms for absorbing, recovering from, and adapting to any adverse events that may happen in the future.

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Appendix 1: Workshop participants

S/N	Name of delegate	Institution	Country	Role
1	Joseph Kalowekamo	Department of Energy Affairs	Malawi	Presenter
2	Harold Chimphepo	Physical Assets Management, Ministry of Health	Malawi	Presenter
3	Barbara Banda	National Association of Business Women	Malawi	Participant
4	Elizabeth Banda	United Purpose	Malawi	Participant
5	Edgar Bayani	Community Energy Malawi	Malawi	Participant
6	Gilbert Chodzaza	ESCOM	Malawi	Presenter
7	Lyness Nkungula	Bankers Association of Malawi	Malawi	Participant
8	Fedrick Munthali	National Commission for Science and Technology	Malawi	Participant
9	Bram Fudzumani	Information and Communication Technology	Malawi	Participant
10	Collen Zalengera	Mzuzu University, Department of Energy Systems	Malawi	Investigator
11	Isaac Chitedze	Mzuzu University, Department of Energy Systems	Malawi	Co-Investigator
12	Vincent Mwale	Mzuzu University, Department of Energy Systems	Malawi	Co-Investigator
13	Timeyo Maroyi	Mzuzu University, Department of Energy Systems	Malawi	Participant
14	Maxon Chitawo	Mzuzu University, Department of Energy Systems	Malawi	Co-Investigator
15	Long Seng To	Loughborough University, Department of Geography	UK	Co-Investigator
16	Andrew Nkoloma	Renewable Energy Industry Association of Malawi	Malawi	Presenter
17	Dwight Kambuku	Practical Action	Malawi	Presenter
18	Emmanuel Mjimapemba	UNDP	Malawi	Presenter
19	Sithembire Tembo	UNDP	Malawi	Participant
20	Shamiso Kacelenga	UNDP	Malawi	Participant
21	Francis Gondwe	Malawi Energy Regulatory Authority	Malawi	Presenter
22	Samuel Mambo	Mulanje Energy Generation Agency	Malawi	Participant
23	Grace Simwaka	United States Agency for International Development	Malawi	Participant
24	Lonjezo Bingalason	Churches Action in Relief and Development	Malawi	Participant
25	Victor Msiska	Mzuzu University, Department of Forestry	Malawi	Participant

Appendix 2: Support personnel directly involved

S/N	Name of Delegate	Institution	Country	Role
1	Yonum Ngwira	Mzuzu University	Malawi	Zoom technical support
2	Mcloud Kaunda	Mzuzu University	Malawi	Zoom technical support
3	Prof. Wales Singini	Mzuzu University, Directorate of Research	Malawi	Research oversight and documentation reviews
4	Dr Michael Zimba	Mzuzu University, Faculty of Science, Technology and Innovation	Malawi	Research oversight and documentation reviews
5	Dr Arts Luwanda	Mzuzu University, Faculty of Science, Technology and Innovation	Malawi	Research oversight and documentation reviews
6	Christine Makamo	Mzuzu University, Administration	Malawi	Documentation reviews
7	William Mota	Mzuzu University, Finance	Malawi	Accounts and finance administration, and due diligence documentation
8	Kumbukani Khoza	Mzuzu University, Department of Energy Systems	Malawi	Administrative support
9	Tiwonge Chirwa	Mzuzu University, Finance	Malawi	Due diligence documentation
10	Tikome Mtawali	Mzuzu University, Procurement	Malawi	Due diligence documentation

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