



Malawi

*Energy and the poor*  
Unpacking the investment  
case for clean energy

## The Making Access Possible Programme

Making Access Possible (MAP) is a multi-country initiative to support financial inclusion through a process of evidence-based country diagnostic and stakeholder dialogue, leading to the development

of national financial inclusion roadmaps that identify key drivers of financial inclusion and recommended action. Through its design, MAP seeks to strengthen and focus the domestic development

dialogue on financial inclusion. The global project seeks to engage with various other international platforms and entities impacting on financial inclusion, using the evidence gathered at the country level.

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The views expressed in this publication are those of the author(s) and do not necessarily represent those of the United Nations, including UNDP, or the UN Member States.

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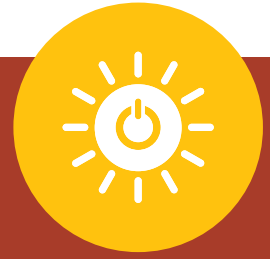
Layout and Design: [www.hybridcreative.co.za](http://www.hybridcreative.co.za)

## The cover symbol and artwork

Through the MAP programme, we hope to effect real change at country level and see the impact of financial inclusion on broader national growth and development. The cover graphic features a Lotus (*Nelumbo nucifera*), the national flower of Malawi. The flower symbolises growth and development while the circle represents inclusive growth. Each flower is an example of the successful growth in a unique environment.







# Working together to support implementation of Agenda 2030

*Countries are seeking new ways to address complex and interconnected challenges. Reaching the promise of the SDGs requires multisectoral approaches that brings together expertise from a range of perspectives. By harnessing our comparative advantage and working within the context of our respective mandates, we can collectively make significant progress towards achieving the vision of the Sustainable Development Goals (SDGs).*

This diagnostic on access to clean energy is a collaboration with the United Nations Development Programme (UNDP) and the United Nations Capital Development Fund (UNCDF) to jointly address UNDP's Signature Solution 5 that seeks to work with countries to close the energy access gap.

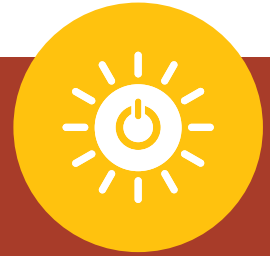
Signature Solution 5 focuses on increasing energy access, promoting renewable energy and enhancing energy efficiency in a manner that is inclusive and responsive to the needs of different sectors of the population, in line with the aspirations of Sustainable Development Goal 7.

This will support countries to transition to sustainable energy systems by working to de-risk the investment environment; attract and leverage private and public-sector resources. In contexts, where energy does not yet reach everybody, it will be necessary to focus on supporting innovative private and public solutions that increase energy access and delivery.

In contexts where energy is already available to most or all people, the focus will be on transitioning to renewable energy and energy efficiency measures and policies.



*UNCDF offers “last mile” finance models that unlock public and private resources, especially at the domestic level, to reduce poverty and support local economic development.*



## Partnering for a common Purpose

*By combining inspiration, ideas and resources with our partners, we become more than the sum of our parts.*

We are committed to empowering investors—public and private—with the clarity, insights and tools they need to optimize the positive impact of their investments, closing the gap between high-level principles and financial performance to make a positive contribution to society.

FinMark Trust is an independent non-profit trust whose purpose is ‘Making financial markets work for the poor, by promoting financial inclusion and regional financial integration’, by using both the creation and systematic analysis of financial services consumer data to provide in depth insights and following through with systematic financial sector inclusion implementation actions to overcome market level barriers hampering the effective provision of services, thus working to unlock real economic sector development through financial inclusion.

The UNDCF, together with MAP partner FinMark Trust, commissioned Nova Economics to undertake a market assessment of the energy needs, usage and market potential, focusing on the potential for cleaner off-grid energy solutions across five countries in the Southern African Development Community (SADC) region, namely Lesotho, eSwatini, Malawi, Mozambique and Madagascar. The objective of this study is to provide insight into the potential to develop the market for, and promote access to, cleaner off-grid energy solutions in the selected countries. This includes insight into the current programmes and initiatives in each market, to assess the current supply and demand for off-grid cleaner energy solutions and the scope for partnerships and innovative financing models to move forward the clean energy agenda under SDG 7 as it relates to financial inclusion and inclusive growth.

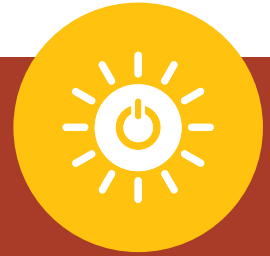
This report represents the country analysis and findings for Malawi only. A separate report for each country is available, as well as a summary report drawing together the findings for all five countries.

### *Note on the use of household data*

Within this document (unless otherwise referenced), demographic, income and financial usage data is obtained from the 2014 FinScope Consumer Survey undertaken in Malawi, while MSME data is obtained from the 2019 MSME FinScope for Malawi. A summary report and presentation of FinScope is available as a separate deliverable, and the FinScope dataset is available for future research at <https://uncdfmapdata.org>.



*The transition to clean and affordable energy helps countries reduce the impacts of indoor and outdoor air pollution, particularly in rapidly developing urban areas.*



## Our technical response

The MAP target market segmentation model identified four crucial consumption needs that households are regularly fulfilling out of their income. Payments for energy and utility services are consistently highlighted as the single most crucial need. The methodology as applied here seeks to address the need for access to energy as it relates to current usage, affordability and access to infrastructure in order to identify and quantify the financing necessary to accelerate the transition to clean energy.

### *UNDP's work on Energy*

UNDP is the leading United Nations organization fighting to end the injustice of poverty, inequality, and climate change. Working with our broad network of experts and partners in 170 countries, we help nations build integrated, lasting solutions for people and planet.

UNDP's Energy team focuses on clean and affordable energy development; low-emission, climate-resilient urban and transport infrastructure; and access to new financing mechanisms. Learn more at [undp.org](https://undp.org) or follow at @UNDP

### *UNCDF's work on Energy*

UNCDF's energy programme aims to improve access to clean energy finance for poor and low-income people. By partnering with energy and financial service providers and offering capital, data analytics, capacity building and policy advocacy services in the off-grid energy finance markets, UNCDF has scaled energy business models for cleaner, efficient and more effective sources of energy for poor people. As of 2019, UNCDF digital energy finance activities have enabled over three million people to benefit from clean energy solutions through micro and PayGo financing.



*The methodology as applied here seeks to address the need for access to energy as it relates to current usage, affordability and access to infrastructure in order to identify and quantify the financing necessary to accelerate the transition to clean energy.*

# Malawi at a glance

*Malawi is a relatively small, landlocked country, with a large, mainly rural population of about 18.1 million people, of which 83.1% live in rural areas. The population density is high (192 people per km<sup>2</sup>) compared to the average for southern Africa of 25 people per km<sup>2</sup>.*



Sources: 1) UN population division, World Population Prospects 2019 2) UN World Urbanization Prospects: The 2018 Revision 3) Derived (population/average household size) 4) UN statistics database, household size and composition - Malawi 2015-16 Demographic and Health Survey 5) CIA World Factbook 6) Country census, demographic statistics database 7) Official extreme-poverty (also called ultra-poverty) is measured as the proportion of the population living below MWK 2,803 (April 2016 prices) measured by the National Statistics Office of Malawi 8) UN Statistics Division 9) IMF, World Economic Outlook database, 2018



The population is growing rapidly and is expected to reach 23 million by 2025. Although unemployment is relatively low at 5.4%, the incidence of extreme poverty (51.5%) is high, especially in rural areas (59.5%). Malawi ranked 171 out of 188 countries on the United Nations Human Development Index.

A substantial portion of the country (20%) is covered in water – mainly lake Malawi. Almost 60% of its land is being used for agriculture and a third is covered in forest. The economy is largely agrarian; 70% of people work in agriculture and the sector represents about 30% of gross domestic product (GDP). The agriculture sector is dominated by two crops, maize for food security and tobacco for export revenues. Growth in the agricultural sector was constrained due to a prolonged drought and low commodity prices. Consequently, GDP grew only 3.5% in 2018 and Malawi's GDP per capita was only USD 389 GDP in 2018 - well-below the average for Sub-Saharan Africa of USD 4,098 (PPP).

## Energy sector overview

Malawi has a total installed capacity of almost 500 megawatts (MW), the majority of which is generated from renewable sources - 385 MW is hydroelectric and 55 MW solar. Although estimated peak demand is only 440 MW, low availability of hydropower, especially during the dry season, means that Malawi often encounters a supply deficit.

Malawi unbundled its electricity industry, separating generation and distribution. The Electricity Generation Company Limited (EGENCO) owns and operates all generation assets, while the Electricity Supply Commission of Malawi (ESCOM) retains the responsibility of bulk purchase, transmission, and distribution via the national grid. ESCOM, originally a vertically integrated public utility, unbundled under the Electricity Act of 2016 and now acts as the single buyer of electricity, procuring electricity from EGENCO, independent power producers (IPPs) and in future the Southern African Power Pool (SAPP).<sup>1</sup>

ESCOM's focus is on connecting high and medium demand customers in urban and peri-urban areas to the national grid. The Government is electrifying rural trading centres across the country under the Malawi Rural Electrification Program (MAREP), the Department of Energy Affairs has been the implementing agency since 1995. The programme is funded through a 4.5% levy on energy sales (i.e. liquid fuels, ethanol, liquid petroleum gas [LPG] and electricity). The focus of the programme which began in 1980, and is now in its eighth phase, is on connecting trading centres in peri-urban and rural areas to the national electricity grid.<sup>2</sup> MAREP



*ESCOM's focus is on connecting high and medium demand customers in urban and peri-urban areas to the national grid. The Government is electrifying rural trading centres across the country under the Malawi Rural Electrification Program*

1 World Bank, Malawi - Electricity Access Project (P164331), World Bank Group (Washington, D.C., 2019), <http://documents.worldbank.org/curated/en/520771561341715792>.

2 Department of Energy Affairs (Republic of Malawi), "Malawi Rural Electrification Programme (MAREP)," (2020). <https://energy.gov.mw/index.php/services/rural-electrification-programme>.

phase eight seeks to connect 336 trading centres to the grid by 2018/19, nearly doubling the total of 375 trading centres connected in the first seven phases.<sup>3</sup>

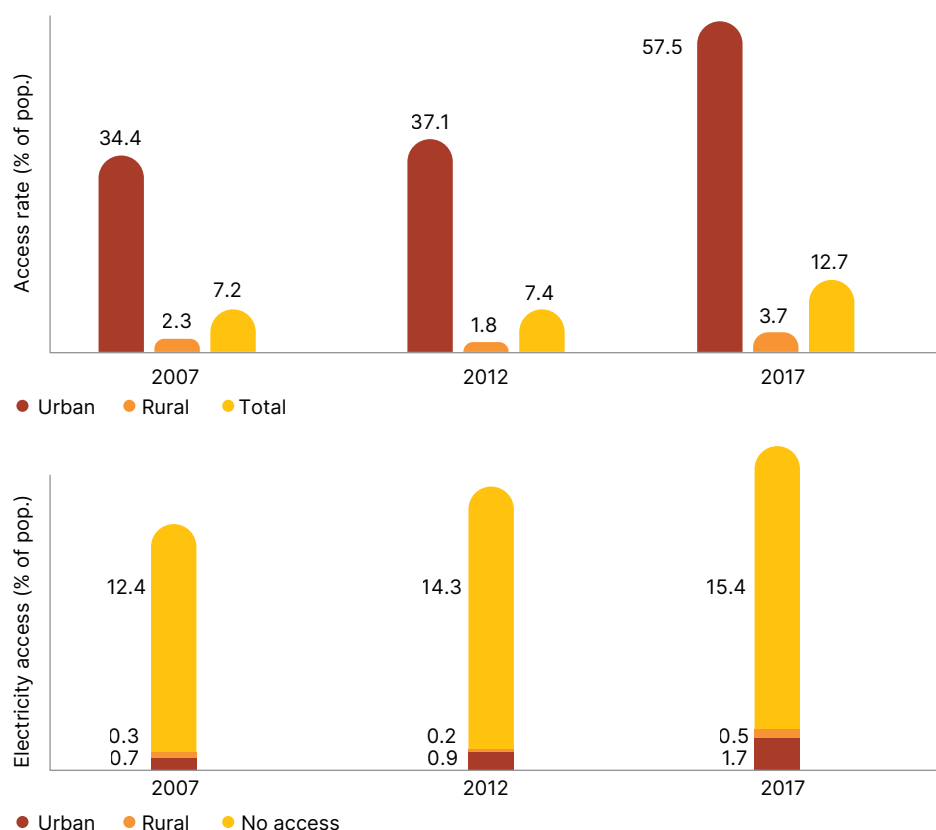
The national energy policy aims to shift energy reliance from biomass to modern sources such as electricity, modern fuels and renewables.



## Electricity access rate and deficit

Malawi has one of the lowest electricity access rates in the world. In 2017 just 12.7% of the population had access to electricity via the national grid which is equivalent to 2.2 million people. While the access rate has almost doubled from 7.4% in 2012, the number of people without access to electricity continued to rise (Figure 1). In 2017 15.4 million Malawians had no access to electricity, up from 12.8 million in 2007. Access to grid-supplied electricity is significantly lower in rural Malawi – in 2017 only 3.7% of the 14.7 million Malawians living in rural areas had access to electricity.

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**Figure 1:** Electricity access, Malawi, (2007, 2012, 2017)

<sup>3</sup> Nellie Kapatuka, "Government Committed to Providing Rural Malawians with Electricity," (2017). <https://www.manaonline.gov.mw/index.php/business/item/4775-government-committed-to-providing-rural-malawians-with-electricity>.



FinScope measures electricity access as at 2014, and corroborates the above trend very well, finding an overall access rate of 9.5% in 2014. By geography, FinScope also fits the trend, with 43.9% of urban adults and 3% of rural adults having access in 2014. In addition, FinScope has a third geographic classification (also used by the Government of Malawi) – peri-urban areas – where the access rate is 14.6%, although only 3.8% of adults live in these areas (306k adults). Access to grid electricity is therefore highly concentrated around urban areas. In fact, very few areas in the country have access rates higher than 15%. FinScope has data for 29 districts or city areas<sup>4</sup>, of which only four areas are higher than 15%. Of these four, three are city areas instead of actual districts, or a district containing a major city area (see Table 2).



*Access to grid electricity is therefore highly concentrated around urban areas. In fact, very few areas in the country have access rates higher than 15%.*

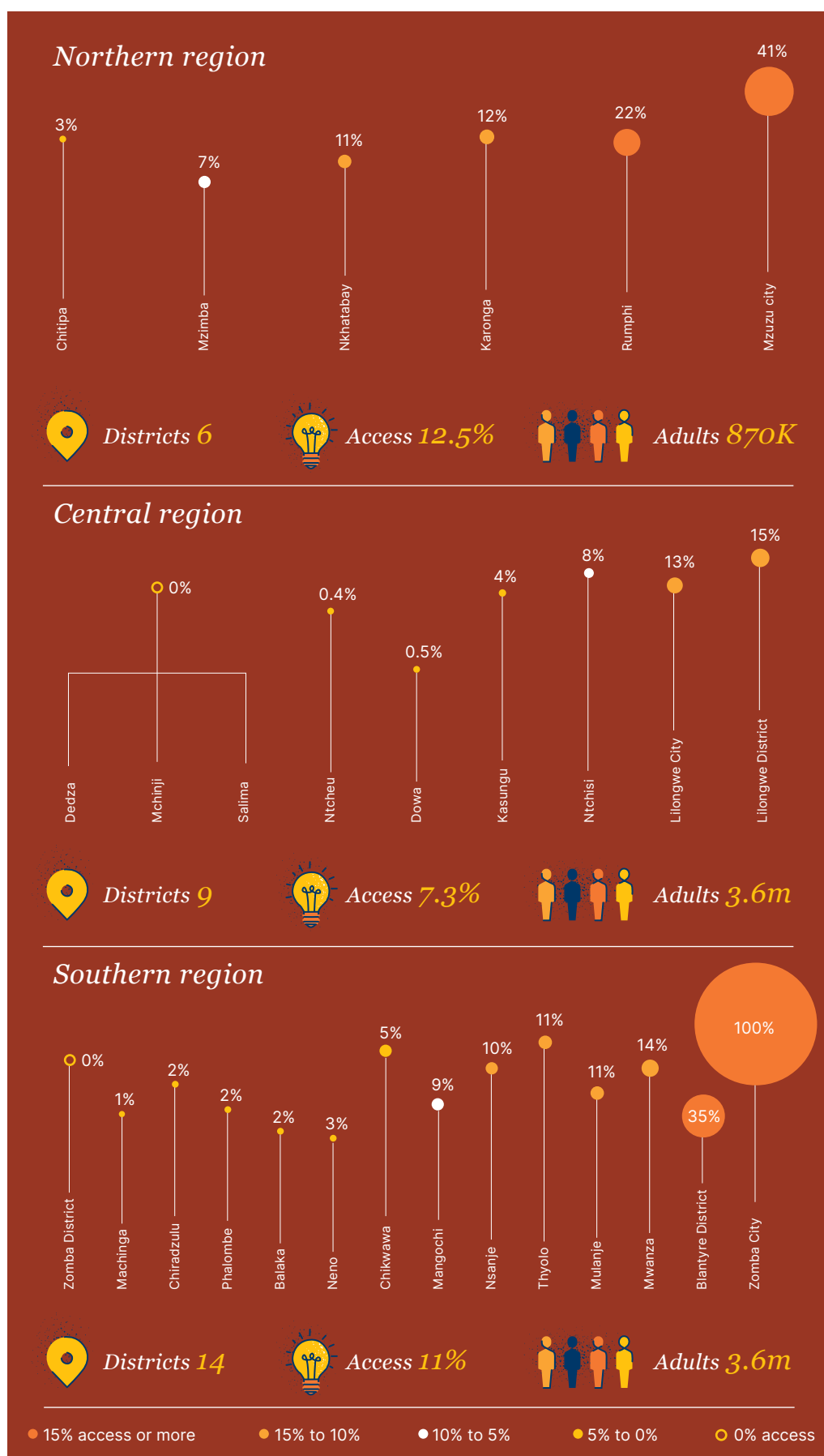
**Table 2: Access rates by region, and number of districts with varying access levels**

	CENTRAL REGION	NORTHERN REGION	SOUTHERN REGION
% of adults with access to electricity	7.3%	12.5%	11.0%
No. of districts (FinScope)	9	6	14
No. of districts with access of 10% or higher	2	4	6
No. of districts with access of 15% or higher	0	2	2
Of which city areas (15%+)	0	1	2

Source: FinScope Malawi 2014

Therefore, there is no single region of Malawi with substantially higher rates of access overall, and half of all districts have access rates of 5% or lower (14 out of 29) – with four of these registering no access in FinScope 2014 (See Figure 2). Only three additional districts have access rates between 5% and 10%, while five more have access between 10% and 12%. This means that 76% of all districts/ areas listed by FinScope have access of less than 12%, while 86% have access of less than 15%.

<sup>4</sup> Malawi has 28 districts, but FinScope does not have data for the districts of Nkhoskotakota, or Likoma, while it includes city areas for Lilongwe, Mzuzu and Zomba (total 29)



**Figure 2: Access to grid electricity by region and district**

Source: Own analysis based on data sourced from the World Bank Development Indicators Database

## Rate of electrification, electrification plans and need for off-grid solutions

The UN's SDG7 aims for universal access to affordable, reliable, sustainable and modern energy by 2030. To estimate the likely future electricity access deficit in 2030, we extrapolated the current rate at which government is electrifying households. Overall, connections have grown on average 11.5% per year in the five years up to 2019 from 238,041 to 409,540. In the fiscal year ending June 2018, ESCOM connected 35,000 new customers.<sup>5</sup> However, this translates to more people having access than there are connections. Between 2012 and 2017, Malawi connected an average of almost 168,000 people in urban areas to the grid per year. Rural electrification was limited to 66,000 people.

If we assume that ESCOM continues to connect the same number of people annually and that Malawi's total population grows from 18.6 million to 24.9 million by 2030 – based on a growth rate of 2.7% in 2018, only 7% of the rural population and 72% of the urban population will have access to the grid by 2030. This would mean that there will be almost 19.5 million Malawians without access to the grid in 2030<sup>6</sup>. The vast majority (18.2 million) of the electricity access deficit will be distributed across rural communities. Most households, especially those in the rural areas, are therefore unlikely to have their homes connected to the grid in the foreseeable future.



*Based on a growth rate of 2.7% in 2018, only 7% of the rural population and 72% of the urban population will have access to the grid by 2030.*

**Table 3: Nominal change in electrification (average annual)**

PERIOD	MALAWI
Urban	
2007 – 2012	43,611
2012 – 2017	167,848
2017 – 2030*	167,848
Rural	
2007 – 2012	4,912
2012 – 2017	65,767
2017 – 2030*	65,767

\* Projected

Source: Own analysis

To achieve universal access to the grid by 2030, the Government of Malawi would have to significantly accelerate electrification efforts. At least 1.4 million rural people have to be provided with electricity access every year. This is 22 times what has been achieved on average in the past five years. Urban electrification needs to be ramped up from 168,000 to 260,000 people annually (a 1.6-fold increase).

Despite extreme low rates of access to grid electricity, most of Malawi's population (95%) lives within ten kilometers of the existing megavolt (MV) grid

5 World Bank, Malawi - Electricity Access Project (P164331).

6 Based on UN population estimates and projections

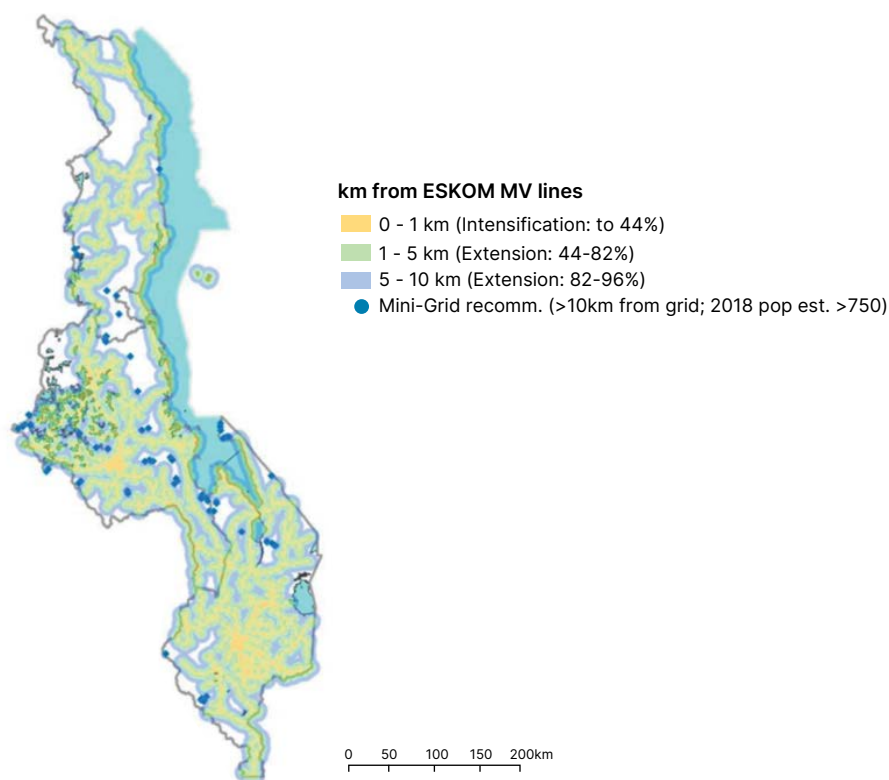


network, and a high percentage of those currently live within five kilometers of the existing ESCOM network infrastructure (Figure 3), according to a recent Geospatial Least-cost Electrification Plan conducted by the World Bank. The report makes a preliminary conclusion that grid electrification is likely to be the dominant least-cost electrification technology.<sup>7</sup> However, similar to our estimates, the World Bank notes that despite the likelihood of the grid to be the dominant least-cost electrification technology for Malawi in the long-term, it is clear that many households will still have to wait several years (more than ten years) for grid access. They estimate that even under a reasonably accelerated grid electrification programme there will still be 3.7 million households (roughly 16 million people) that require off-grid electricity solutions by 2030.

They therefore recommend that the fastest way to electrify households is through grid electrification, with support of off-grid electrification where the grid will not reach in the short term and envisages that most of this will be undertaken by the private sector. The World Bank's baseline scenario off-grid component includes the scale-up of standalone solar home system (SHS). While it is envisaged that the off-grid expansion will include mini-grids, it was recognised that a range of technical studies would still need to be completed to assess the changes required to the regulatory framework to facilitate private investment.



*Even under a reasonably accelerated grid electrification programme there will still be 3.7 million households (roughly 16 million people) that require off-grid electricity solutions by 2030.*



**Figure 3: Grid extension and mini-grid recommendations for Malawi based on geospatial analysis**

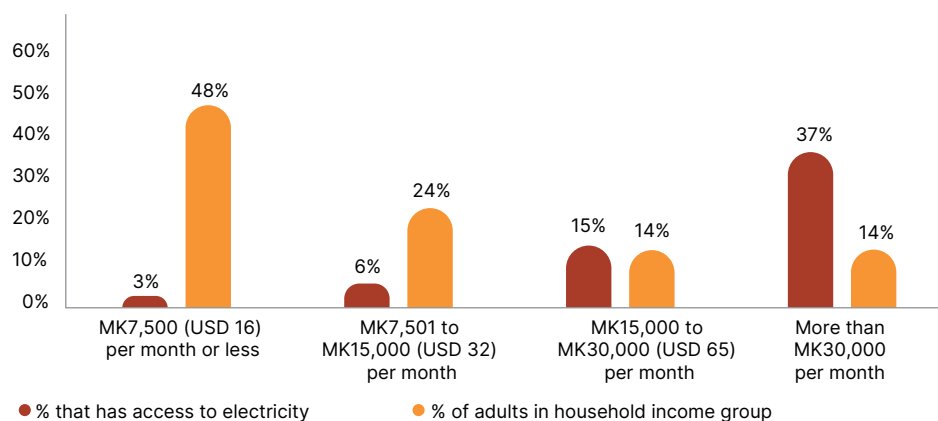
Source: World Bank (2019), Malawi - Electricity Access Project (P164331).

7 World Bank, Malawi - Electricity Access Project (P164331).

## A closer look at access: consumer realities on the ground

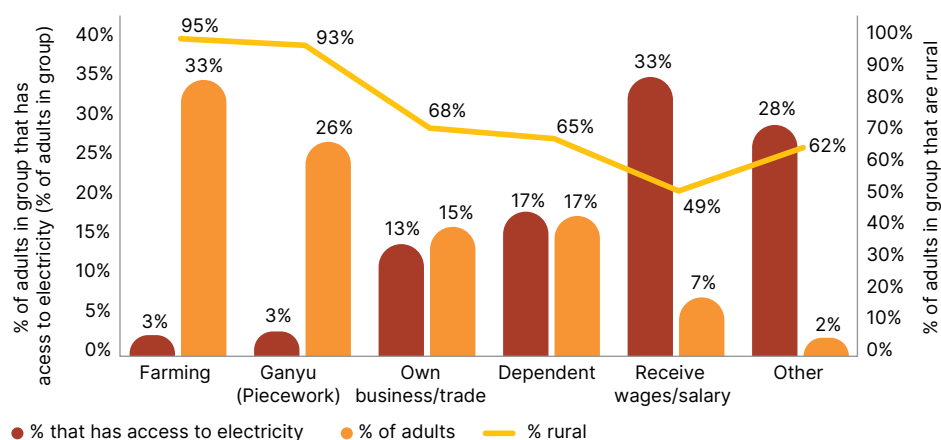
Geographic location therefore has an obvious impact on access, given the infrastructure requirements for distribution. However, there are other demographic indicators that also provide useful insights into access to electricity. For instance, access increases significantly over income, with the poorest (and also largest) groups, having the least access, while those who earn more have higher access. However, even for high income groups, access is still relatively low - with access peaking at only 37% for the highest income group in Malawi – households earning more than MWK 30,000 (USD 65) per month (only 14% of adults live in these households).

To a large extent, this is because income is influenced by geographic location, but it provides a useful breakdown within the same location as well. Income source is another useful indicator, as those with the same income source tend to have similar characteristics, and also tend to live in similar types of locations. Access to electricity by income group negatively correlates almost directly with



**Figure 4:** Access to grid electricity versus household income

Source: FinScope Malawi 2014



**Figure 5:** Access to electricity versus income source

Source: FinScope Malawi 2014

both the size of the income group (proportion of population in income group), as well as to the proportion of adults in each income group that are rural. In other words, the income groups that are both the largest and most rural, have the lowest access rates to electricity, and vice versa.

It is obvious that farmers and ganyu (pieceworkers) have by far the lowest rates of access (only 3%), but they are also by far the most rural (between 95% and 93% are rural). Together, these two groups make up 59% of all adults, so any meaningful impact on access would have to include solutions aimed directly at their specific circumstances. However, even groups that are far more urban, as well as typically receive far higher incomes, still have relatively low rates of access to electricity (for instance only 33% of those who receive a salary/wage has access). This means that there are much lower hanging fruit for the short term to expand access, and begs the question whether there are supply side constraints in Malawi that are influencing the low rates of access.

Education is another demographic indicator that correlates strongly with access to energy. For instance, of those who have no, or only primary education, only 2% to 4% have access to electricity (76% of the population). Those with a secondary education (in full or in part) have between 19% and 40% access (another 21% of the population). Those with an education in addition to secondary (vocational or tertiary) have the highest levels of access - between 37% and 55%, but this is only 3% of the population.



*Even groups that are far more urban, as well as typically receive far higher incomes, still have relatively low rates of access to electricity.*

## Programmes and initiatives to promote the uptake of off-grid cleaner energy

As a result of regulatory restrictions affecting the return on investment (see Section 6), the only existing mini-grid projects in Malawi have been donor-funded. These include two renewable energy projects funded by the Government of Scotland between 2015 and 2018. A three-year project funded by the Government of Scotland called the Sustainable Off-Grid Electrification of Rural Villages Project (SOGERV), explored the potential to deploy solar PV off-grid solutions in Malawi. SOGERV was launched in four rural communities in the Chikwawa District (Gola, Kande, Mandrade, and Thendo) and set out the demand for services that require electricity as an input.<sup>8</sup> (See box in Section 6 for more details).

The UNDP has been involved in a project to increase access to clean and affordable decentralised energy services via mini-grids in selected vulnerable areas of Malawi since 2015.<sup>9</sup> The UNDP has assisted the Government of Malawi in revising its energy policies, legislative and regulatory frameworks to create an enabling environment for mini-grids and greater private participation in the power market. The UNDP is also supporting the development of two mini-grid pilot projects – an 80 kilowatt (kW) solar mini-grid at Sitolo Village in Mchinji District which currently connects 150 households, a maize mill, primary school, health facility, churches and will be expanded to connect a further 800 households.

<sup>8</sup> Frame et al., “Experiences from deploying solar PV energy businesses in rural Malawi”.

<sup>9</sup> Etta Mmangisa (UNDP), email correspondence with the authors, 15 April 2020.



The UNDP in Malawi has also been involved in the expansion of the expansion of the Mulanje Electricity Generation Agency (MEGA) hydro-powered mini-grid in Mulanje from 60 kW to 220 kW and connections from 179 households to 1,250 households, one health centre, four maize mills, five primary schools, and shops.<sup>10</sup> The project has found that the mini-grid power quality is comparable to the national utility grid as required by the mini-grid regulatory framework. However, one challenge the mini-grid projects have faced is that the power plant utilisation rate has been lower than expected. The solar mini-grid plant utilisation peaks at 15% of the available power and the hydro mini-grid registered peak demand of 30% of available capacity.<sup>11</sup>

The next project the UNDP intends to roll out is aimed at providing support for the beneficiaries of the mini-grid projects to engage in income-generating activities through productive use of energy. There have been no reported difficulties from the households that have been connected in the purchase of energy units for their use, however, the initial capital outlay for internal household wiring has proven a challenge for those that are not connected.

Until 2019, the presence of development partners in the off-grid energy space in Malawi had been scarce.<sup>12</sup> Before 2019 the largest support was provided by Department for International Development (DfID) with a USD 2 million contribution to the African Enterprise Challenge Fund (AECF) for concessional loans and grants.<sup>13</sup> However, this initiative did not succeed in promoting the uptake of SHS as it was under-resourced and underfunded.<sup>14</sup>

In January 2019, United States Agency for International Development (USAID) through its Power Africa programme launched an off-grid facility with results-based financing (RBF) component of USD 1.5 million. The programme aims to catalyse the market in the short term over three years (2019–2021).<sup>15</sup> In terms of the RBF mechanisms, the company only disburses the grant once the energy service company has made a sale – the sponsored companies are required to finance and sell the systems before being paid a subsidy out of the grant facility by USAID.

The five key components of the programme are 1) a USD 1.5 million RBF grant facility aimed at stimulating the sale or provision of 150,000 new SHS off-grid connections; 2) access to working capital; debt and equity finance from various local financial institutions; 3) operation support i.e. technical assistance to SHS companies; 4) a consumer solar awareness and education campaign; and 5) policy and regulatory reform initiatives including strengthening fiscal incentives and support like value-added tax (VAT) and duty exemptions.



*The UNDP in Malawi has also been involved in the expansion of MEGA hydro-powered mini-grid in Mulanje from 60 kW to 220 kW and connections from 179 households to 1250 households, 1 health centre, 4 maize mills, 5 Primary Schools, and shops.*

10 Etta Mmangisa (UNDP), email correspondence with the authors, 15 April 2020.

11 Etta Mmangisa (UNDP), email correspondence with the authors, 15 April 2020.

12 Yellow, in interview with the authors, 26 February 2020.

13 Alexandros Korkovelos et al., "The Role of Open Access Data in Geospatial Electrification Planning and the Achievement of SDG7: An OnSSET-Based Case Study for Malawi," *Energies* 12, no. 7 (2019), <https://www.mdpi.com/1996-1073/12/7/1395>.

14 Yellow, in interview with the authors, 26 February 2020.

15 Gogla, "USAID-Power Africa Solar Home System Kick-Starter Program for Malawi," (2019). <https://www.gogla.org/usa-id-power-africa-solar-home-system-kick-starter-program-for-malawi>.

The World Bank's Off-Grid Market Development Fund, the second component of the organizations overall Malawi Electricity Access Project, significantly scaled-up to support what is assumed will be a growing off-grid market sector.<sup>16</sup> It was designed in close cooperation with USAID and will have three financing components: 1) a mini-grid facility that will be delivered to mini-grid enterprises on completion of project preparation; 2) revolving working capital loans; and 3) a RBF grant facility that will deliver loans and grant financing to off-grid solar enterprises.

The World Bank Off-Grid Market Development Fund will be USD 30 million - USD 24 million in International Development Association (IDA) credit and USD 6 million provided as a grant. The other component of the World Bank's Malawi Access Project will be running a larger (USD 105 million) complementary grid-extension programme. This component will provide credit for cost-effective, priority investments in grid electrification by supplying households living near existing distribution infrastructure leveraging on geospatial analysis to maximize the number of connections under the financing. The intermediate target for additional grid connections is one million people, from 140,000 household grid connections and a further 100,000 household off-grid connections.

There is also an umbrella body for private sector participants in the renewable energy industry – the Renewable Energy Industries Association of Malawi (REIAMA). The association draws its membership from organisations, individuals, projects and programmes who have a verifiable interest in the promotion, production, supply, importation, exportation, installation and servicing of renewable energy technologies in Malawi. Refer to Table 4 for a summary of the programmes and initiatives running in Malawi.



*The intermediate target for additional grid connections is 1 million people, from 140 000 household grid connections and a further 100 000 household off-grid connections.*

**Table 4: Programmes and initiatives to support the uptake of off-grid energy, Malawi**

DONOR	FUNDING	DATES	TECHNOLOGY	OBJECTIVES
UNDP	USD 4 million	2015 to 2021	Mini-grids	To increase access to energy in selected remote, rural areas in Malawi by promoting innovative, community based mini-grid applications in cooperation with the private sector and civil society.
DfID – African Enterprise Challenge Fund	USD 2 million	Up to 2018	Solar PV (pico), SHS	Concessional loans and grants. Yellow's CEO noted that this initiative did not succeed in promoting the uptake of SHS as it was under-resourced and underfunded.

<sup>16</sup> Yellow, in interview with the authors, 26 February 2020.

DONOR	FUNDING	DATES	TECHNOLOGY	OBJECTIVES
USAID through its Power Africa programme Kickstarter	USD 1.5 million	2019 to 2021	SHS, ICS	In January 2019, USAID through its Power Africa programme launched an off-grid facility with a RBF component of USD 1.5 million. The programme aims to catalyse and stimulate the market in the short term over 3 years (2019-2021). In terms of the RBF mechanisms, the company only disburses the grant once the energy service company has made sales – the sponsored companies are required to finance and sell the systems before being paid a subsidy out of the grant facility by USAID.
World Bank Malawi Electricity Access Project - Off-Grid Market Development Fund	USD 30 million	2019 to 2023	Mini-grids, SHS, ICS results-based financing	World Bank's Off-Grid Market Development Fund which is the second component of the World Bank's overall Malawi Electricity Access Project has been designed as a follow-on to the USAID programme but significantly scaled-up to support what is assumed will be a growing off-grid market sector, as noted by Yellow's CEO. It was designed in close cooperation with USAID and will have three financing components – a mini-grid facility that will be delivered to mini-grid enterprises on completion of project preparation, and revolving working capital loans and a RBF grant facility that will deliver loans and grant financing to off-grid solar enterprises. The World Bank off-grid market development fund will be USD 30 million - USD 24 million in IDA credit and USD 6 million provided as a grant.
World Bank Malawi Electricity Access Project - grid-extension programme	USD 105 million		Grid-densification	World Bank's Malawi Access Project will be running a larger (USD 105 million) complementary grid-extension programme. This component will provide credit for cost-effective, priority investments in grid electrification by supplying households living near existing distribution infrastructure and leveraging geospatial analysis to maximize the number of connections under the financing. Finally, the third component is the technical assistance and implementation support to EDM and FUNAE. The intermediate target for additional grid connections is 1 million people, comprising approximately 140,000 household grid connections and a further 100,000 household off-grid connections.





## 2 / Access to electricity

### A framework for access to energy

Typical measures of energy access include the proportion of households that have access to electricity via the national grid. Simple measures like this, however, cannot provide an accurate view of the quality and quantity of energy provided. Our series of reports on the SADC countries, which this report is part of, applies a more detailed framework for the evaluation of access to energy, based largely on the ESMAP/SEforALL multi-tier framework.

Access to energy is an enabler of socio-economic development. Universal access to 'modern energy' by 2030 is one of the three key pillars of the Sustainable Energy for All (SEforALL) programme. SEforALL is an initiative co-chaired by the Secretary-General of the United Nations (UN) and the President of the World Bank. The SEforALL multi-tier framework provides three main sources of energy used by households: 1) electricity, 2) solid fuels and 3) modern fuels. Solid and modern fuels are used primarily for cooking and heating. Solid fuels as defined in the multi-tier framework include biomass such as wood, charcoal and dung, as well as coal. Modern fuels include LPG, natural gas, kerosene (including paraffin), ethanol, and biofuels.<sup>17</sup>

The multi-tier approach measures access to household electricity as a continuum of improvement (as opposed to a binary metric like access vs. no access) by reflecting all attributes of electricity supply that affect the user's experience while being technology and fuel neutral. Different energy services (such as lighting, television, air circulation, refrigeration, space heating, etc.) require different levels and quality of energy. The actual use of energy might be constrained by factors such as capacity, availability, affordability, and convenience amongst others. In terms of the framework, households in Tier 0 are said to have no access to electricity while households in Tier 5 have full access to reliable, safe and good quality electricity. Access to all sources of energy can be measured using multi-tiered standards, including access to cleaner off-grid electricity. The relevant ESMAP/SEforALL multi-tier standards for household access to grid-supplied electricity are presented in Table 5.



*The actual use of energy might be constrained by factors such as capacity, availability, affordability, and convenience amongst others.*

<sup>17</sup> Mikul and Angelou, "Beyond Connections - Energy Access Redefined."

**Table 5: Multi-tier energy framework to measure access to household electricity supply**

ATTRIBUTES	TIER 0	TIER 1	TIER 2	TIER 3	TIER 4	TIER 5
Power capacity ratings (daily watt-hour - Wh)		Min 12 Wh	Min 200 Wh	Min 1.0 kWh	Min 3.4 kWh	Min 8.2 kWh
Supported appliances		Task lighting and phone charging	General lighting, phone charging & television/fan (if needed)	Tier 2 and medium power appliances	Tier 3 and high-power appliances	Tier 4 and very high-power appliances
Typical supply technologies		Solar lantern	Small solar home systems, Rechargeable battery	Medium solar home systems, Fossil fuel-based generator, Mini-grid	Large solar home systems, Fossil fuel-based generator, Mini-grid, Central grid	Large fossil fuel-based generator, Central grid
Availability (Duration)		Min 4 hrs	Min 4 hrs	Min 8 hrs	Min 16 hrs	Min 23 hrs
Reliability					Max 14 disruptions per week	Max 3 disruptions per week of total duration <2 hrs
Quality					Voltage problems do not affect the use of desired appliances	
Affordability				Cost of a standard consumption package of 365 kWh/year <5 % of household income		

Source: ESMAP, SEforALL (2015) Energy Access Redefined.

Off-grid technologies such as SHS can be used to provide electricity services from Tier 2 to Tier 4, while mini-grids are typically used to provide services from Tier 3 to Tier 4. Table 6 illustrates which energy services can be accessed by households at each tier and which of the services could be met using either solid or modern fuels. While solid and modern fuels can often be used instead of electricity for cooking, heating and lighting, access to electricity is required for most other energy services.



*While solid and modern fuels can often be used instead of electricity for cooking, heating and lighting, access to electricity is required for most other energy services.*

**Table 6:** Access to energy services by tier and source of energy

Energy services	ELECTRICITY						MODERN FUELS	SOLID FUELS
	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5		
1. Lighting		✓	✓	✓	✓	✓	✓	✓
2. Entertainment and communication		✓	✓	✓	✓	✓		
3. Space cooling and heating			✓	✓	✓	✓	✓	✓
4. Refrigeration				✓	✓	✓		
5. Mechanical loads				✓	✓	✓	✓	
6. Product heating					✓	✓	✓	✓
7. Cooking				✓	✓	✓	✓	✓

Source: Own analysis based on ESMAP SEforALL. 2015. Energy Access Redefined

## Availability, reliability, and quality of grid-supplied electricity

Estimates suggest that peak demand in Malawi frequently exceeds generation supply by 17% (roughly 60 MW). Malawi is heavily reliant on hydropower, which accounts for 75% of the total installed electricity capacity. Generation capacity is therefore dependent on prevailing hydrological conditions. A prolonged drought over the past two years reduced Lake Malawi's water levels and limited the generating capacity of downstream hydro-plants. ESCOM implemented loadshedding for 12 to 16 hours a day for several months in 2018/19. In October 2019 however, ESCOM implemented loadshedding for up to 18 hours a day. Availability of grid-supplied electricity in Malawi would therefore only meet Tier 2 requirements.<sup>18</sup> The most recent ESCOM loadshedding schedule, from December 2019, shows planned outage of four and six hours a day, every day of the week. This limits Malawi's electricity supply rating to Tier 4 (Table 7).

**Table 7:** Grid-supplied electricity rating, Malawi

		TIER 0	TIER 1	TIER 2	TIER 3	TIER 4	TIER 5
	HOURS PER DAY		Min 4 hrs	Min 4 hrs	Min 8 hrs	Min 16 hrs	Min 23 hrs
RELIABILITY	HOURS PER EVENING		Min 1 hr	Min 2 hrs	Min 3 hrs	Min 4 hrs	Min 4 hrs
						Max 14 disruptions per week	Max 3 disruptions per week of total duration <2 hrs
QUALITY						Voltage problems do not affect the use of desired appliances	

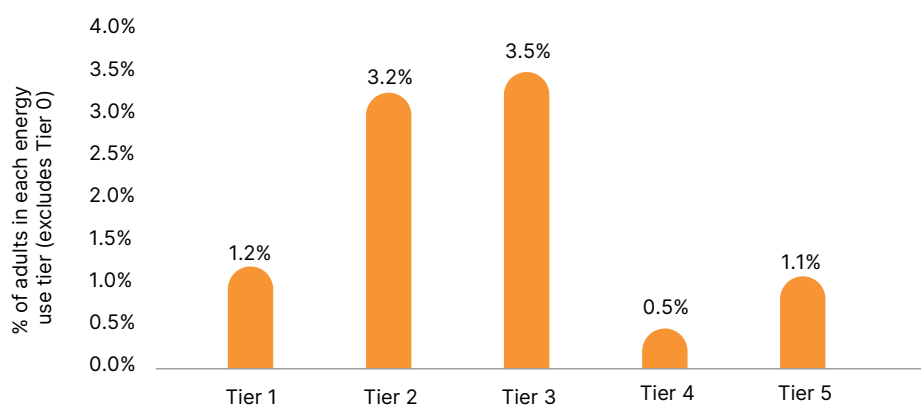
18 "Electricity Management Program: Southern Region," 2020, <http://www.escom.mw/electricity-management-south.php>.



Using the reported energy source for lighting and cooking, as well as reported asset ownership of electric appliances (TVs, refrigerators and electric water heaters), FinScope is able to categorise all adults into the six tier's as set out by the framework. These take into account users who do not have access to electricity (Tier 0), who use very limited electricity only for lighting/charging purposes (Tier 1), and those who use electricity for lighting and who has a TV, but no other electric appliances (Tier 2). Tier 3 include those who use electricity for lighting, and has a TV and refrigerator (medium power appliances), while Tier 4 also uses electricity for cooking (high power appliance). Tier 5 are the highest end users, who, in addition to the previous, also have electric water heaters (very high power appliances). As only 9.5% of adults have access to electricity, this means that 90.5% fall in Tier 0. The remainder of the adults (9.5%), are split into the remaining 5 tiers as follows:

90.5%

*As only 9.5% of adults have access to electricity, this means that 90.5% fall in Tier 0.*



**Figure 6: Estimated energy consumption based on energy use**

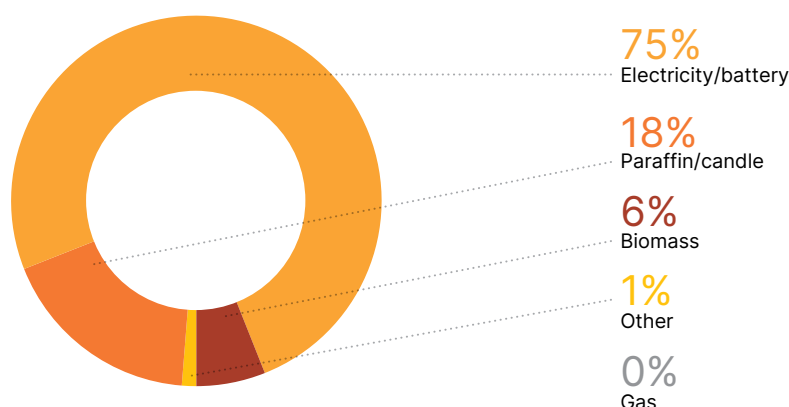
Source: FinScope Malawi 2014

This would imply that the majority of adults fall in Tier 2 to 4 as predicted (76%), but that in fact, these are mostly clustered in Tier 2 and 3. And since more adults are in Tier 1 versus Tier 4 - a greater majority of adults who have access to electricity are in fact clustered in Tier 1 to 3 (84%). Furthermore, using the ESMAP/SEforALL multi-tier standards framework, this would imply that almost half of adults who report having access to electricity (those in Tier 1 & 2, or 47%), use less than 1 kWh per day (the minimum daily watt-hour usage for Tier 3).

### 3

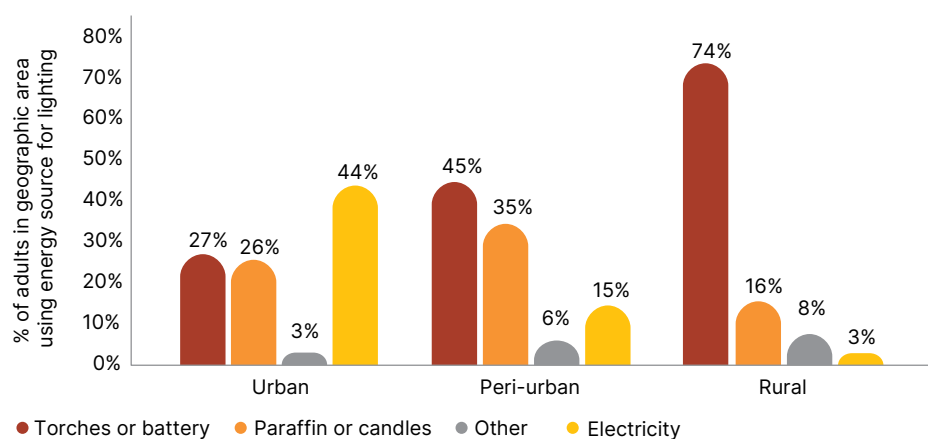
## Consumer profile of energy needs and usage

In countries where electricity is not yet widely available or reliable, and where affordability is still an issue for the majority of the population, electricity usage is mostly limited to lighting, and not for higher intensity purposes like cooking, refrigerators, etc. In Malawi, most people actually rely on non-electrical means of lighting because electricity access overall is so low. Electric lighting is therefore still uncommon (9.5%) with the majority of Malawians relying on battery-powered torches for lighting (66%), and there is some use of paraffin (11%) and candles (7%). Only 1.3% of adults reported their source of energy for lighting as solar – and almost none of these adults resided in urban areas.



**Figure 7: Energy sources used for lighting, Malawi (% of households)**

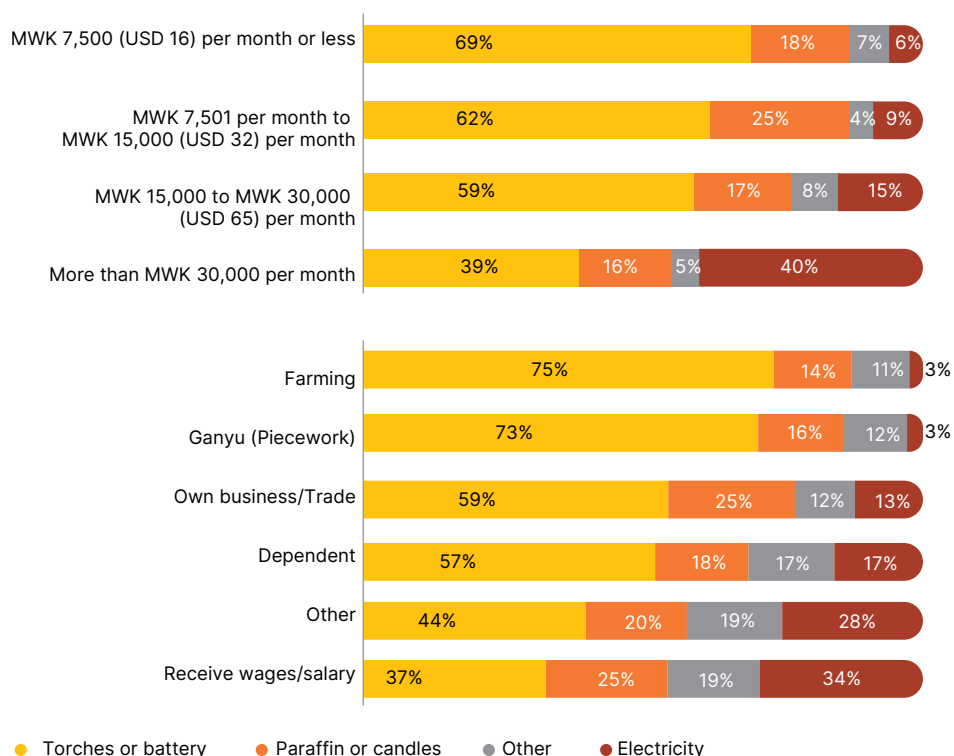
Source: Own analysis based on Cenfri's 2014 FinScope Consumer Survey for Malawi.



**Figure 8: Energy sources used for lighting by urban/rural**

Source: FinScope Malawi 2014





**Figure 9: Energy sources used for lighting by income level and income source (%)**

Source: FinScope Malawi 2014

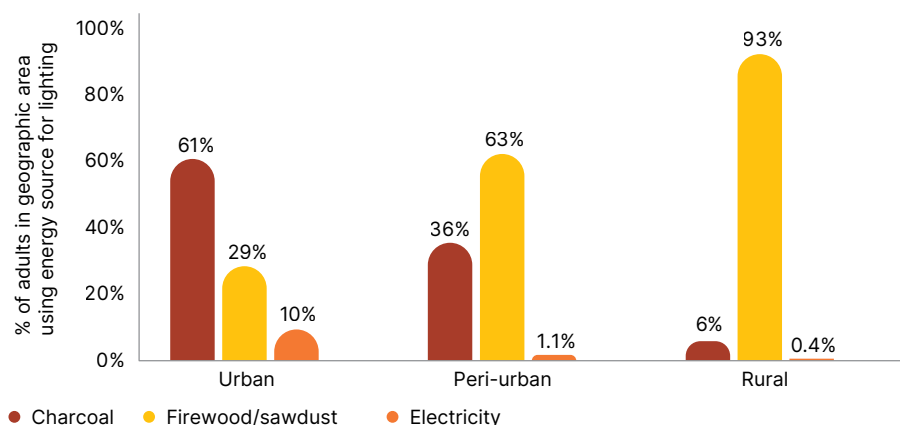
However, there are significant changes in the energy sources used for lighting based on geographic location. For instance, electricity is the single largest energy source for lighting in urban areas, at 44% of adults. In peri-urban and rural areas, sources and batteries remain the single largest source (45% and 74%), followed by paraffin or candles. Hardly anyone in rural areas (3%) uses electricity for lighting, while hardly anyone in urban areas use solar energy (0.2%).

Furthermore, both income level and income source has significant influence over the type of energy used for lighting purposes. For instance, the use of torches or batteries decreases as income increases, from 69% for the lowest income groups to only 49% for the highest income groups, while the use of electricity increases substantially from only 6% for the lowest income groups to 40% for the highest. Similarly, for income source, farmers and ganyu have the highest use of torches or batteries (75% and 73%), while those who receive a salary or wage have the lowest (only 37%). The highest use of electricity for lighting is also by this group, at 34%, compared to 3% of farmers and ganyu. Perhaps the biggest impact on the use of electricity is from education. Those with a tertiary education report 55% access, versus 2.5% for those with no education. The fact that only 40% of those who earn more than MWK 30,000 (USD 65) per month uses electricity for lighting points to serious supply side issues, as electricity for lighting is usually the most basic/affordable use of electricity, and even the lowest income groups use electricity for this purpose (where available), in countries like eSwatini.



*The use of torches or batteries decreases as income increase, from 69% for the lowest income groups to only 49% for the highest income groups, while the use of electricity increases substantially from only 6% for the lowest income groups to 40% for the highest.*





**Figure 12: Energy sources used for cooking by geographic location**

Source: FinScope Malawi 2014

more than MWK 30,000 (USD 65) per month. The use of firewood decreases substantially over income (from 88% to 52%), while this is mostly substituted with charcoal (increasing from 11% to 37%). By income group, farmers and ganyu use firewood the most (94% and 92%), while those who earn a salary or wage uses both charcoal and electricity the most (38% and 8%). However, even for this group, the majority (54%) uses firewood for cooking. Education again has the single biggest impact, with 40% of those with a tertiary education using electricity to cook, and only 10% using firewood, but 50% of this group still uses charcoal to cook. Of those who are older than 60 years, 98% uses firewood to cook.

## Cost and affordability of grid-supplied electricity

ESCOM's tariffs have increased 20% year-over-year in the 2018/19 period as the regulator approved a 31% increase in ESCOM's average tariffs over the four years from 2018 to 2022. The latest published tariffs (effective since 1 October 2018) for single-phase standard residential supply is MWK 67 (USD 0.09) per kWh (Table 8). The first 50 kWh per month is discounted to MWK 48 (USD 0.07) per kWh.<sup>19</sup> A standard consumption package (SCP<sup>20</sup>) at the lifeline rate costs ~MWK 17,520 (USD 24) and ~MWK 24,455 (~USD 33) at the standard tariff.



*Education again has the single biggest impact, with 40% of those with a tertiary education using electricity to cook, and only 10% using firewood, but 50% of this group still uses charcoal to cook.*

**Table 8: Cost of grid-supplied electricity, Malawi (2020)**

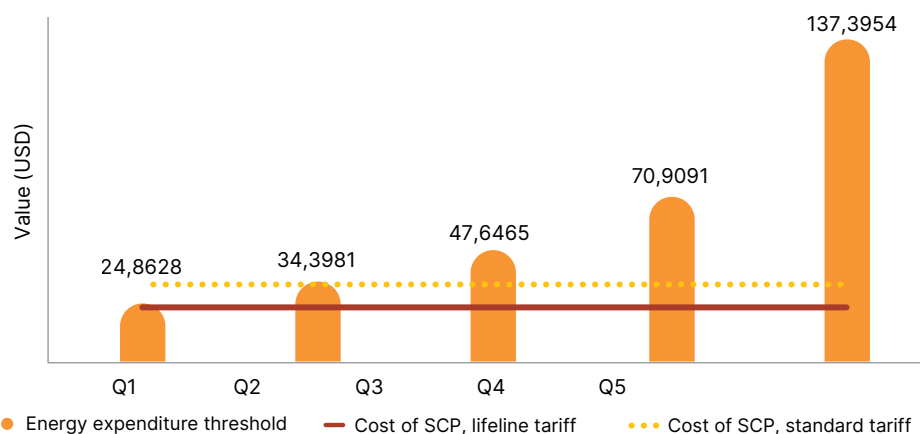
	CURRENCY	COST PER KWH	COST OF SCP (365 KWH)
Residential tariff, prepaid	MWK	67	24,455
	USD	0.09	33
Lifeline tariff, prepaid	MWK	48	17,520
	USD	0.07	24

Source: Own analysis based on tariff data from ESCOM

<sup>19</sup> "Current Tariffs," ESCOM, 2018, <http://www.escom.mw/current-tariffs.php>.

<sup>20</sup> We used an SCP of 1 kWh per day, or 365 kWh per year as a cross country comparable minimum usage benchmark





**Figure 13: Affordability of grid electricity, Malawi (2020)**

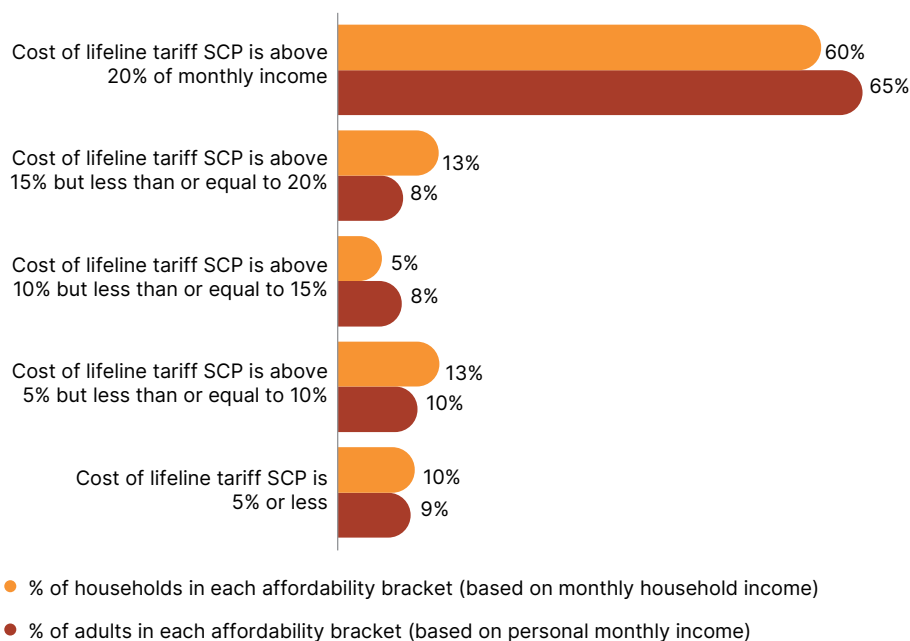
Note: Cost of SCP: Lifeline tariff = USD 23.49; Standard tariff = USD 33.26  
Source: Own analysis.

The ESMAP/SEforALL multi-tier framework measures the affordability of grid electricity by comparing the cost of a SCP of 365 kWh per year to a maximum energy expenditure threshold, set at 5% of total household expenditure (Figure 13). According to this metric, households in the bottom expenditure quintile (Q1) would struggle to afford a SCP at the lifeline tariff and it would be difficult for a household in the second-lowest expenditure quintile to afford an SCP at the standard residential tariff.

However, FinScope provides more granular income data, which can be used to calculate the proportion of both adults (using monthly personal income), and households (using monthly household income) that falls into different affordability groups. In other words, the proportion of adults or households where the SCP (at the lifeline tariff) would be in a specific range of affordability, in relation to monthly income. Using this measure, it is clear that the majority of the population in fact would struggle very much to afford electricity at all: 65% of adults and 60% of households would pay more than 20% of their monthly income to buy a SCP – some significantly more than that. In fact, 8% of households would pay 146% of monthly household income, and another 10% would pay 58% of monthly household income. Furthermore, only 9% of adults, or 10% of households would pay 5% or less of their monthly income to buy the SCP – corresponding remarkably well with the overall level of access to electricity in the country. Another 26% of adults (or 31% of households) would pay more than 5% and up to 20% of their monthly income – which is not unheard of – for instance, in Madagascar, where most households who have access to electricity pay between 10% and 20% of monthly income.



*It is clear that the majority of the population in fact would struggle very much to afford electricity at all.*



**Figure 14:** Proportion of adults in different affordability groups of the SCP at the lifeline tariff

Source: FinScope Malawi 2014

## Cost reflectivity of grid electricity

Electricity in Malawi is not cost-reflective (revenue from the tariff does not cover the full costs of producing power plus a market-related return on capital invested). In a study in 2016, the World Bank estimated that the true cost of supplying power in Malawi was USD 0.13 per kWh while the current household tariff is USD 0.09 per kWh.<sup>21</sup> This implies that the tariff would need to increase by ~40% and/or measures to improve the efficiency of electricity production would have to be introduced if the tariff were to become fully cost-reflective.

21 Trimble et al., Financial viability of electricity sectors in Sub-Saharan Africa: Quasi-fiscal deficits and hidden costs.

# 4 / MSME energy use for productive purposes

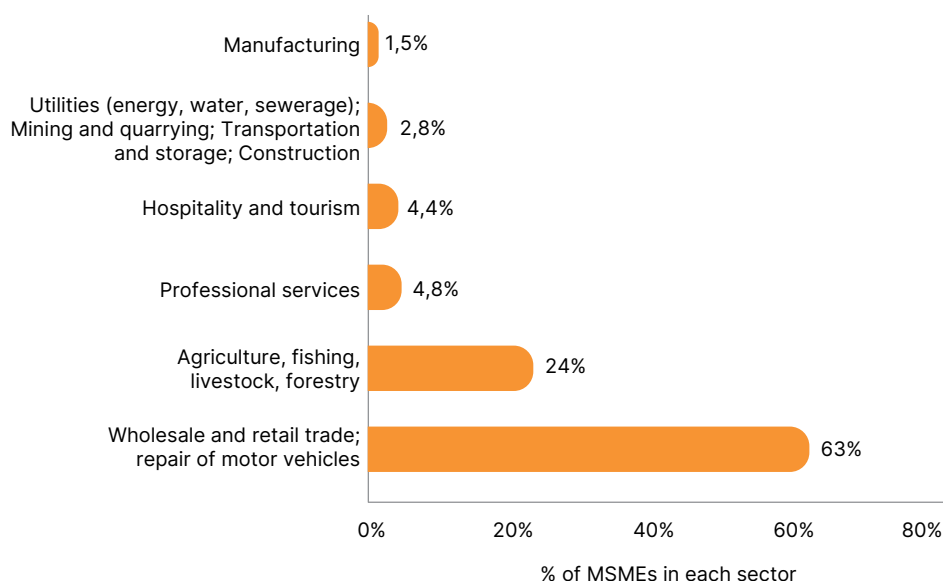
## Small business profile

In 2019, there were 1.14 million Micro, small and medium sized enterprises (MSMEs) in Malawi, including one million individual entrepreneurs (not employing anyone), and an additional 138,798 other business owners with 683,551 employees. A total of 1,825,219 people work in the sector (FinScope Malawi MSME 2019). However, the majority of MSMEs in Malawi are very small: 74% are micro entrepreneurs – either employing four people or less (including the owner), or with a very low annual turnover (up to MWK 5,000,000/USD 6,775). A further 23% are small enterprises, employing five to 20 people, or with a turnover between MWK 5,000,001 to MWK 50,000,000 (USD 67,751). Only 3% are medium enterprises (21 to 99 employees or turnover MWK 50,000,001 to MWK 500,000,000 or USD 677,507).

The vast majority of MSMEs (78%) are in rural areas. While micro enterprises are more likely to be owned by women (56%), the majority of small and medium enterprises are owned by men (68% and 87%). In 2019, 32% of MSMEs indicated that they operate from a business premises. The vast majority of MSMEs trade informally (89%), being neither registered nor licensed .

74%

*The majority of MSMEs in Malawi are very small: 74% are micro entrepreneurs – either employing 4 people or less (including the owner), or with a very low annual turn-over.*



**Figure 15: MSMEs classified by main business sectors, Malawi (2019)**

Source: Own analysis based on 2019 FinScope MSME Survey for Malawi.

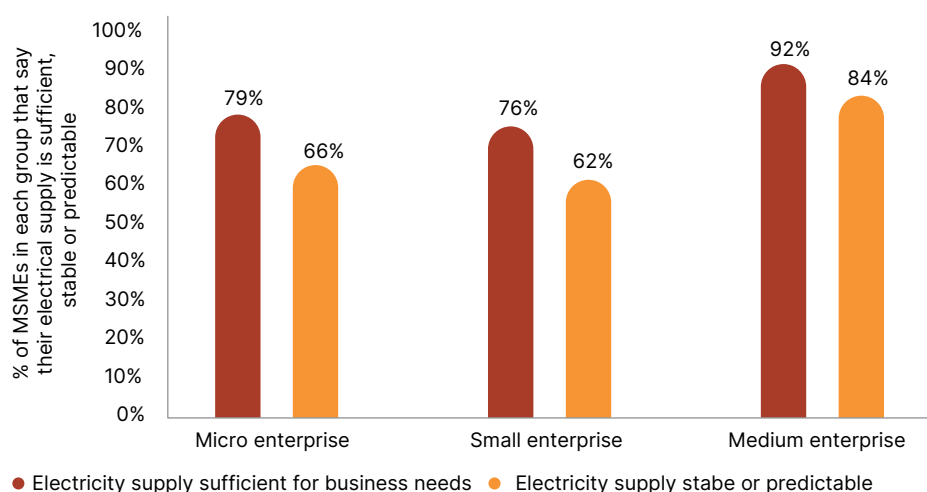
FinScope classified MSMEs in terms of the main business sectors they are engaged in (selected from a predefined set of options) is presented in Figure 15. The majority of MSMEs (63%) are in trade. This is down from 87% in 2012. An additional 24% are in the agriculture sector (including fisheries, and forestry). The remaining 13% of MSMEs render professional services<sup>22</sup>, or work in the hospitality and tourism, utilities, mining and quarrying, transportation and storage, construction or manufacturing sectors.

## MSME access to electricity

Only 18% of Malawian MSMEs have access to grid electricity, but an additional 9% have access to solar or generator electricity. A total of 26% therefore have access, surpassing the average access rate for the adult population, even if adjusted for 2019. However, this is generally still low for MSMEs, and access to grid electricity is still particularly low, although access does vary by sector, size, location, age of business, and even the gender and education of the business owner. For instance, 51% of urban MSMEs have access versus only 9% in rural areas, while male owned MSMEs have an access rate of 25% versus 11% for female owned businesses. The education of the owner also has a significant impact, with owners that have no education only having 2% access and owners who have any additional training or qualifications above secondary having 47% access. Access increases from 13% for micro entrepreneurs to 43% for medium enterprises, and from 14% for young businesses (0-2 years) to 25% for businesses more than ten years old. The professional services sectors also have the highest rate of access (53%) while hospitality/tourism and agriculture have the lowest (5% and 8%).



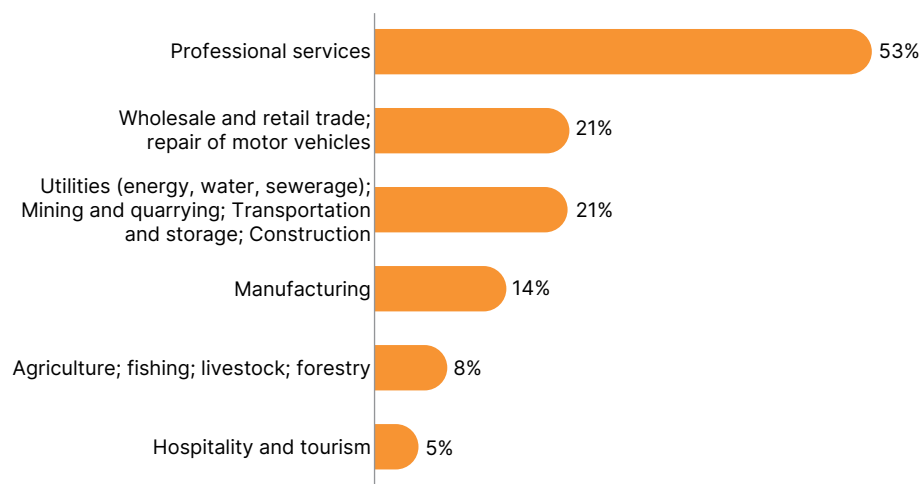
*Access increases from 13% for micro entrepreneurs to 43% for medium enterprises, and from 14% for young businesses to 25% for businesses more than 10 years old.*



**Figure 16: Access to electricity by main business sectors, Malawi (2019)**

Source: Own analysis based on 2019 FinScope MSME Survey for Malawi.

<sup>22</sup> This includes scientific, technical, information, admin, financial, real estate, arts, entertainment, recreation, education and health



**Figure 17: Sufficiency, stability or predictability of electricity supply to different sizes of MSMEs (2019)**

Source: Own analysis based on 2019 FinScope MSME Survey for Malawi.

To a large extent though, this can be driven by the geographic location of certain sectors (for instance agriculture and tourism), or by the types of businesses selected by the owner (women tend to participate more in trade, while the higher educated participate more in professional services). The use of solar or generator power also seem to be a substitute for businesses who require access to energy, but do not have access to the grid. For instance, 83% of businesses that report using solar or generator power are in rural areas, and only 7% of those that have access to grid electricity uses solar or generator power. They are also mostly limited to two sectors: 93% are in the trade and agricultural sector. Interestingly, a slightly higher percentage of businesses in the professional services use solar or generator power (10.1%) compared to these two sectors (9.5% & 8.7%). Similarly, male owned businesses are more likely than female owned ones to use this source (11% vs. 6%), and those with an education higher than secondary are just slightly more likely to use it (10.1% versus 8.3% to 8.6% for the rest).

Of those who have access to grid electricity, only 79% say that the supply is sufficient for their business needs, and only 66% say that the supply is stable or predictable. This increases over the size of the MSME though, as depicted in Figure 17.



*Of those who have access to grid electricity, only 79% say that the supply is sufficient for their business needs, and only 66% say that the supply is stable or predictable.*

## Electricity as a constraint to business growth

Despite these low access rates, access to electricity does not feature high in MSME responses regarding the main risks to their operations and business income. Only 6.5% said that connecting electricity was an issue, while survey respondents noted that the biggest threats to businesses' operations and income in Malawi are sourcing money (53%), lack of customers (31%), selling prices that are lower than expected (26%), and problems with transporting stock (24%). This again varies by size of business and location - small enterprises struggle with electricity the most (13%), while medium enterprises does so the least (1%), and



In 2019, more than a quarter of MSME owners (26%) were financially excluded, i.e. they do not use any financial products or services to manage business finances. However, this did improve significantly from 2012 (59%). Financial inclusion among business owners is low, particularly for savings, borrowings and insurance products. Financial product usage by MSMEs is driven mainly by savings products, with 56% saving in 2019. Most small business owners did not borrow in the last 12 months (64%). This was largely due to the concern that they would be unable to repay the debt. In the event of loss, most small business owners have no coping strategy or safeguards in place to absorb the losses; and those who do, rely mainly on borrowing and savings: 97% of Malawian MSMEs do not have any insurance.

The sectors that report electricity as the biggest constraint include professional, scientific and technical services (29%), hospitality and tourism services (26%), information and communication services (16%), and the repair of motor vehicles (15%). Manufacturing on the other hand, has a very low reported rate at only 1%, which is surprising, given that only 14% of manufacturing businesses report access to grid electricity and only 2% access to solar or generator electricity. This perhaps indicates that the MSME manufacturing industry is very light, and points to an opportunity to support the development of heavier manufacturing industries in Malawi.



*The low importance of access to electricity reported by MSMEs relative to other business constraints may mean that although there is a significant access deficit, uptake may be limited by low willingness to pay.*

# 5

## Access to financial services, availability and cost of credit

Overall access to financial services is still relatively low in Malawi, with 52% of adults not having formal or informal access in 2014. Only 27% have access to a bank account, and an additional 7% have access to other formal financial services (but not a bank account). A further 15% have access to informal financial services (but no formal financial services). Total usage of other formal products is 17% (including those who also have a bank account), while total usage of informal services is 25% (including those who also have formal financial services). There is therefore substantial overlap between those who have bank accounts, and those who use other formal or informal financial services.

While access is low, it is also mostly driven by payments and remittance products, as formal access to savings, credit and insurance products are very low, with formal savings the highest of the three (15%). Insurance is very low at only 2%, but this is not uncommon in SADC markets, even in countries where savings and credit are much higher. Malawian's have limited access to credit from formal providers. In FinScope's 2014 survey, 15% reported that they had a loan with family or friends, 7% said they had a loan with a savings club and only 4% reported that they had a loan with a bank or another formal financial institution. Malawi has two credit reference bureaus – Credit Data CRB and CRB Africa. According to the World Bank development indicator database they cover 23% of Malawian adults.



*Only 27% of adults have access to a bank account, and an additional 7% have access to other formal financial services other than a bank account.*

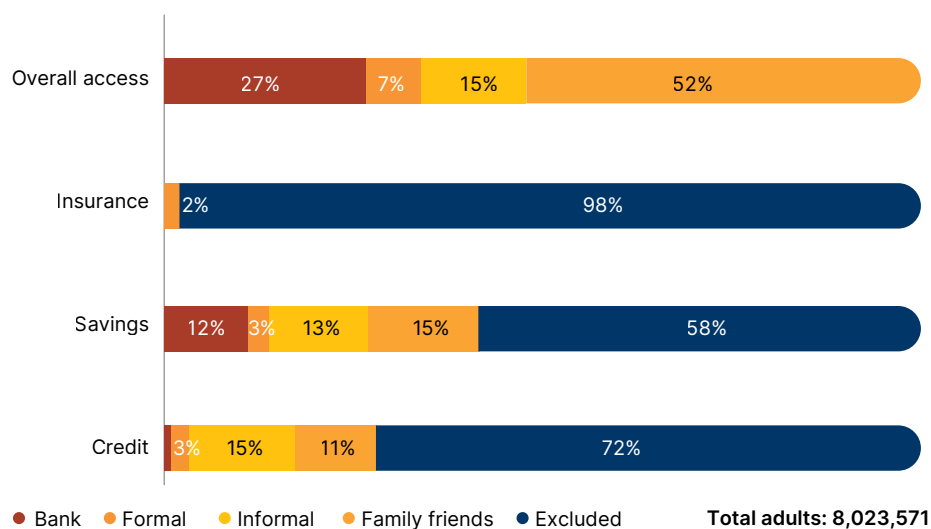


Figure 18: Access to financial services in Malawi, 2014

Source: FinScope Malawi 2014







# The investment case for cleaner off-grid solutions

Although grid electrification appears to be the least-cost electrification strategy for Malawi, several millions of households will need an alternative solution in the interim.

As a first step to address and achieve the objectives of increased access for households, we have attempted to size the market, based on two typical stand-alone solutions currently available in the market.

Total cost is USD 40, providing a low-end solution with three lights and charging solution. This is typically sold for cash but assumed it could be sold on an instalment basis over a maximum repayment period of 12 months.

Package includes four lights, a mobile device charger, and possibly a low power appliance (e.g. radio) with a purchase price of USD 102 per year over a 24 month repayment period.

SOLUTION	BENCHMARK PRICE (USD)	FUNCTIONALITY
Pico-solar (low-end)	42	Three lights and mobile device charging 
Basic SHS (high-end)	102	Four lights, mobile device charging, low power appliance (e.g. radio) 

98% of adults and households do not use electricity for cooking, and the market for improved efficiency, non-electrical or clean energy products for cooking would therefore also be substantial – depending on their cost and affordability in relation to current methods used for cooking. However, given that the above solutions cannot be used for cooking (which require a Tier 3 solution), the market for these two options is therefore limited to those households who currently don't have access to grid electricity or solar/generator power. This equates to about seven million adults, or three million households (89% of adults or 91% of households). Despite the vast market for clean energy products for lighting and cooking, affordability remains a major constraint to the market for SHS in Malawi. There is however a clear incentive for households to purchase small SHS systems as they can replace candles and paraffin typically used for lighting and phone charging services which currently cost about USD 6 per month.

Three thresholds of affordability for these two products can be considered: 1) The installments noted are equal to 5% of actual monthly income or less. In other words, this would apply to the proportion of the population that earns enough monthly income that the noted installments would be 5% of their monthly income or less. This threshold is based on the ESMAP/SEforALL multi-tier framework measures for the affordability of grid electricity; 2) An affordability threshold of

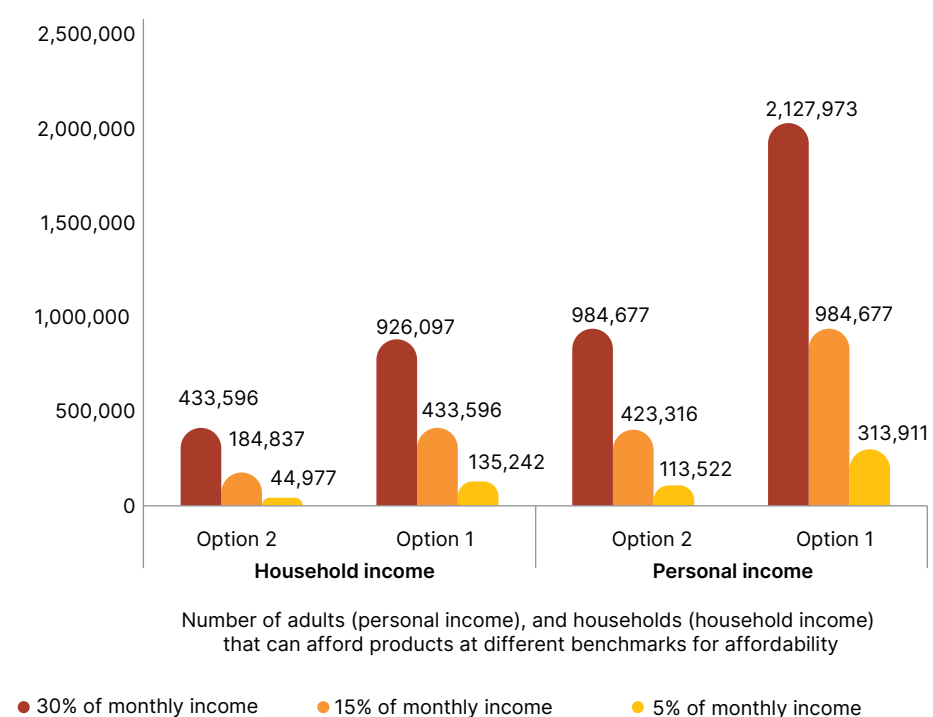


*There is a clear incentive for households to purchase small SHS systems as they can replace candles and paraffin typically used for lighting and phone charging services which currently cost about USD 6 per month.*



15% - based on typical total energy expenditure in comparable countries; and  
 3) A threshold of 30% - which is an expected benchmark for total household indebtedness – given that this is a credit product, and that, once paid off, the household assumingly does not have further expenses in this regard. The latter however assumes that the individual or household would have no additional debt obligations.

With these assumptions and using FinScope 2014 income distributions for individuals and households, we calculate both the proportion and the number of adults and households that would be able to afford option 1 and option 2 at the three levels of affordability thresholds. The proportion of adults and households that can afford these products at the 5% affordability threshold is 6% (option 1) and 2% (option 2). At the 15% affordability threshold, the proportion is 19% and 8%, while at the 30% affordability threshold, the proportion is 40% and 19%. Accordingly, between 135,000 and 926,000 households would be able to afford option 1, while 45,000 and 434,000 households would be able to afford option 2.



**Figure 21:** Number of adults and households that can afford products at different benchmarks for affordability

Source: Own calculations using FinScope Malawi 2014

# 7 / The market for off-grid solutions for households

To understand the market for off-grid energy solutions in Malawi we interviewed Yellow, an energy service company.<sup>26</sup> Yellow has created a digital platform, Ofefee, that enables merchants across Africa, including Malawi, to provide SHS and other products as well the financing behind these products. Ofefee turns every operational process into information and empowers its distributed network of agents.

The market in Malawi for off-grid cleaner energy products is small but emerging.<sup>27</sup> Until recently, it consisted mostly of lanterns and other small products sold on a cash basis or through donor initiatives. Since 2018, three companies including Yellow have entered the market – the other two are Solarworks, who are primarily based in Mozambique and Vitalite who started in Zambia. Other energy service companies that appear to be involved in the distribution of SHS in Malawi include Zuwa and M-PAYG (see Table 9 for available product information on three providers).



*The market in Malawi for off-grid cleaner energy products is small but emerging.*

**Table 9:** Standalone SHS solutions available in Malawi (2019)

STANDALONE SHS SOLUTIONS	TIER	ANNUAL COST (USD)	REPAYMENT PERIOD
Sun King; Boom; Vitalite; Pico Solar Single light and phone charging solution <b>&lt;10-watt solution</b>	1	42	Once off cash price
Yellow Solar Home System Three lights and phone charging <b>6-watt solution</b>	1	102	24 months
Zuwa Solar Home System; KWACHA 4 Four lights and phone charging. <b>10-watt solution</b>	1	162 204	18 months Once-off cash price
Zuwa Solar Home System MACHEZA Four lights, phone charging and a TV. <b>55-watt solution</b>	2	437 612	21 months Once-off cash price

<sup>26</sup> Yellow, in interview with the authors, 26 February 2020.

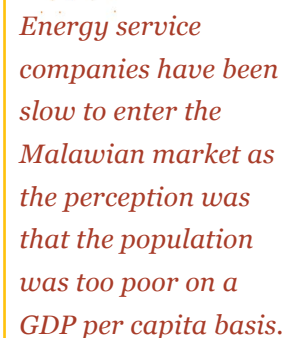
<sup>27</sup> Yellow, in interview with the authors, 26 February 2020.

Energy service companies have been slow to enter the Malawian market as the perception was that the population was too poor on a GDP per capita basis. Yellow notes that while incomes are very low, there are also low levels of inequality so that people appear to have slightly higher incomes on average than in Mozambique for example. Yellow has found that consumers are very price-sensitive and that affordability is a major constraint. They initially set the prices at a level that was too high and have learnt from experience that consumers are astute and will not buy solar solutions if it costs them more than the existing alternatives. From this, they have learnt to price their products at the point that is truly equivalent to the household spend on lighting and phone charging which is around USD 5 (MWK 3,690) per month. At this price, the alternative is to use candles, purchase battery-powered torches and pay a person to charge their phone, but for the same price, a SHS meets these needs and provides twenty times more lighting. Though Yellow has estimated that at USD 5 a month, the addressable market for a Tier 1 solution could be in the region of two million households (or half of all households in Malawi), our analysis shows much less households can afford this package (434,000). Yellow has successfully sold 10,000 SHS on a pay-as-you-go (PayGo) basis in Malawi to date (approximately the past year), a total of between 12,000 and 14,000 SHS units were estimated to have been sold by all players combined.

Some of the main barriers to uptake of off-grid solutions in Malawi include high-distribution costs, limited access to credit and financing alternatives to PayGo, relatively low mobile penetration rates (and mobile money use) and the lack of a regulatory environment conducive to the development of mini-grids.




distances between customers is a challenge for both sales and after-sales service. Yellow Africa has overcome this problem by partnering with local entrepreneurs who act as agents that facilitate last-mile distribution (both sales and after-sales servicing). While per capita income in Malawi is relatively



low compared to other Southern African countries, the population is quite concentrated in the unelectrified areas in Malawi, so this makes distribution easier and more cost-effective than in many other Southern African countries. An agent selling Tier 1 systems needs to be able to reach at least 1,000 households within a five to ten kilometer radius for the agent economics to work. If the population density is lower than this, it will be difficult to run a profitable agency.



*Low access to credit and few alternatives to PayGo*



One of the most important dimensions of the enabling environment for off-grid cleaner energy solutions is the extent to which people can access finance to purchase these products. Given relatively large upfront costs of the products relative to income in developing countries, few consumers can buy the solutions on a cash-basis and rely on access to credit from microfinance providers or instalment payment mechanisms known as PayGo. Energy service companies in Malawi primarily sell Tier 1 solar solutions to households on an instalment or PayGo basis.<sup>28</sup> There are currently limited alternative financing mechanisms to PayGo for SHS, and Malawian's have limited access to credit from formal providers (4%; FinScope 2014). Since 2014 however, the cost of credit, measured by the official bank lending rate, has fallen dramatically from over 40% to 13.50%, and access is likely to have improved as a result.

Nevertheless, banks target high-net-worth individuals and do not provide loans for SHS. They also require forms of collateral that most of the unelectrified population are unlikely to have (e.g. land). Savings and Credit Cooperative Organizations (SACCOs) on the other hand, of which there are 37 (Reserve Bank, 2018), typically target the salaried employee market. It is only microfinance institutions (MFIs) therefore, that tend to serve lower-income customers. The Reserve Bank of Malawi reported 65 MFIs at the end of 2018 including eight deposit-taking institutions and 40 microcredit agencies. However, these MFIs typically provide finance at one level below which the banks provide and one level above what is required for Tier 1 SHS customers (85% of the market).<sup>29</sup> In addition, although they report to have a low income focus, MFIs also tend to target a narrow band of salaried employees, government employees, from whom they have a salary deduction. Nonetheless, there may be an opportunity for microfinance providers to partner with energy service companies that currently provide solutions on a PayGo basis as they may be able to leverage the PayGo providers distribution networks to profitably serve a segment of the market that was not previously served.<sup>30</sup>

28 Yellow, in interview with the authors, 26 February 2020.

29 Yellow, in interview with the authors, 26 February 2020.

30 Yellow, in interview with the authors, 26 February 2020.



### *Relatively low mobile phone penetration and the use of mobile money*

Another barrier to the uptake of PayGo in Malawi is the cost and availability of mobile money services. Malawi has relatively low mobile phone penetration compared to other Southern African countries – GSMA reports that there are ~5.4 million unique mobile phone subscribers in the country (or 29.75% of the population). However, Malawi’s network coverage was estimated at 72% in 2016<sup>31</sup>, and take-up of mobile subscriptions would therefore mostly be influenced by demand side factors, including income and affordability. Although mobile money can facilitate clean energy sales, people who cannot afford a mobile phone are also less likely to be able to afford a solar product. However, recent data suggests that the number of mobile money subscribers has increased dramatically to 18.3% of the population; and the Reserve Bank of Malawi reports that there are now 3.5 million active mobile money subscribers (with activity within the last 90 days).<sup>32</sup> This substantially exceeds the number of people with access to electricity or solar/generator power, so should offer opportunities to expand access nevertheless.



### *The regulatory environment is not currently conducive to the development of mini-grids*

Yellow noted that the current regulatory environment is not conducive to the development of mini-grids.<sup>33</sup> While the returns on mini-grids are similar to that of a utility-scale or IPP project, the issue is trying to fund their development because the risk profile is significantly higher. After all, the off-taker is not the government but a community of rural households. The tariffs that mini-grids can charge are regulated and often not enough to provide the investor with an adequate return for the underlying risk. Malawi lacks the regulatory framework, funding structures and payment mechanisms to support the development of mini-grids. Our analysis in Section 4.2 also showed that current regulated grid-electricity tariffs are not cost-reflective (they are implicitly subsidised) and this is also a deterrent to private investors in alternative solutions. As a result, the only existing mini-grid projects in Malawi have been donor-funded. While the World Bank’s Geospatial Least-cost Electrification Plan identified mini-grid locations for investment (Figure 3), the government will need to work towards establishing a regulatory framework and business model that can attract the private sector into this space.

GOGLA, the global association for the off-grid solar energy industry reports information on the trends in sales of off-grid solar-powered lighting systems (including SHS) and appliances that can be used off-grid across several countries

31 Based on data sourced from ITU World Telecommunication/ICT Indicators Database (2016)

32 Reserve Bank of Malawi, *National Payment Systems (NPS) Report- Fourth Quarter 2019*, Reserve Bank of Malawi, <https://www.rbm.mw/Home/GetContentFile/?ContentID=35444>.

33 Yellow, in interview with the authors, 26 February 2020.





internationally. Their estimates, however, are based solely on data reported by affiliate companies which are thought to represent approximately 30% of the market for solar lanterns with a solar module capacity of <11 Watt Peak (Wp) and 60% to 80% of the market for SHS >11 Wp although this varies from country to country.

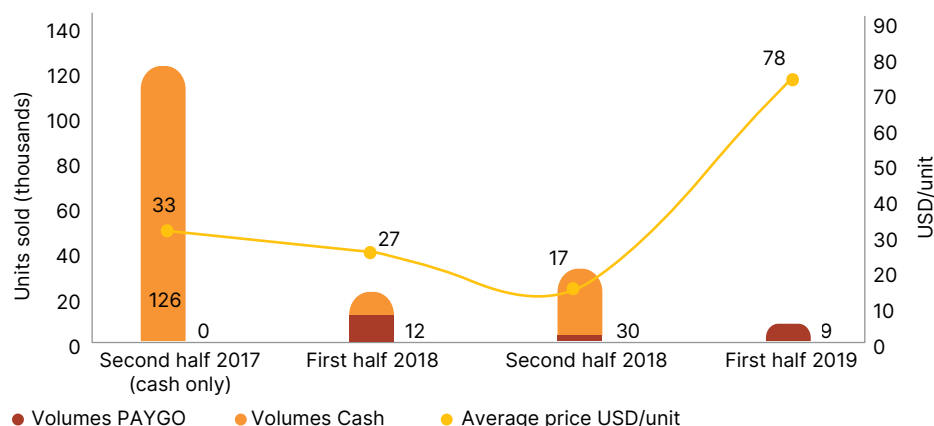
GOGLA reports on sales in two main product categories:

1. Solar lighting systems – these range from a single solar-powered lantern with a solar module capacity of <1.5 Wp (Tier 1 access) to larger SHS of 100+Wp that are capable of powering basic home appliances such a television, refrigerator etc (Tier 3 access).
2. Off-grid appliances – theses include the sale of a range of solar-powered appliances including TVs, refrigerators, fans, and water pumps.

Data extracted from GOGLA's biannual market updates suggested that ~9,000 solar lighting and SHS units were sold in Malawi in the first half of 2019, down from 33,000 units in the previous six months (Figure 18). A record 126,000 units were sold in 2017 but these were likely smaller lanterns since they were bought for cash. It appears that PayGo has become the preferred and dominant means of purchasing solar lighting and home systems. The average price of units sold has increased from USD 17 to USD 78 suggesting consumers have begun to purchase larger SHS solutions, perhaps because of the availability of credit via PayGo. The total value of sales over the 12 months to June 2019 was ~USD 1.2 million.

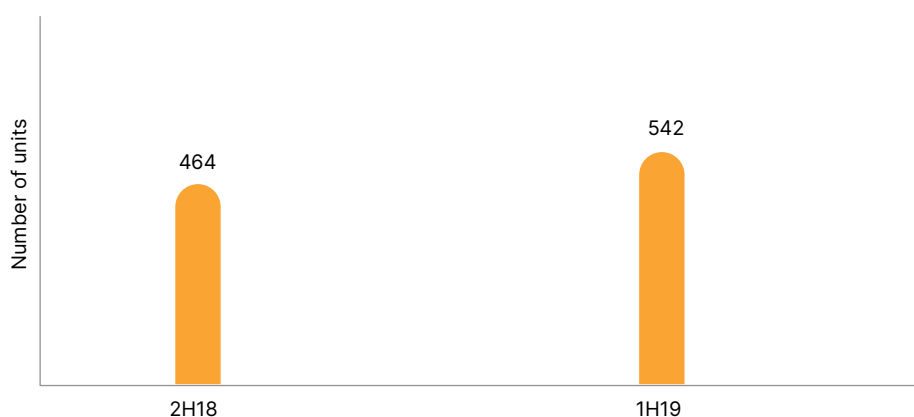
A recent report by the World Bank suggests that the factors that are contributing to the development of the solar lighting and SHS market in Malawi include:

- The entrance of several new SHS providers including M-PAYG, Yellow, and Zuwa who are offering a relatively low-cost range of SHS.
- Consumers appear to be switching to purchasing the solutions on credit via PayGo.



**Figure 22:** Volume of Tier 1 solar lighting and solar home systems sold, Malawi (2017 - 2019)

Source: GOGLA's biannual market updates, 2019



**Figure 23: Volume of Tier 2 off-grid solar-powered appliances sold, Malawi (2018/19)**

Source: GOGLA's biannual market updates, 2019

GOGLA collects data on purchases of four types of solar-powered appliances that require a Tier 2 SHS – namely televisions, fans, refrigerators and solar water pumps. Recent data reported by GOGLA on the volume of off-grid solar appliances sold in Malawi suggest that roughly 1,000 units are sold each year (Figure 23). The aggregate sales data for the Sub-Saharan African region show that most solar-powered appliances purchased in the region are televisions. SHS providers operating in Malawi such as Zuwa and Mphamvu offer a range of SHS solutions. However, only the most expensive SHS in the range can power a television – the package includes a 55 W solar panel, 12 AH battery, 4 LED lamps and a 19 inch flat TV with inbuilt decoders for Digital TV (Kiliye Kiliye) and Free To Air Satellite TV for USD 768 or MWK 562,200 repayable over 21 months.

Projects like SOGERV (see Box) show that there is demand and willingness to pay for basic services that require electricity as an input. Electricity services with the highest potential in the pilot villages include phone and battery charging services and supplying wired electricity connections for lighting and basic appliances to co-located micro-enterprises (e.g. cold drink vendors, barbershops, video shows and hardware stores).<sup>34</sup> The results suggest that few Malawian MSMEs could afford to rent standalone SHS capable of powering refrigerators, basic appliances and shop lighting at a monthly price of between MWK 15,000 and MWK 20,000 (USD 20 to USD 27). Wired connections at a cost of MWK 10,000 (USD 14) per month, however, appeared to be more affordable.<sup>35</sup> The monthly earning potential of energy supply companies appears to be in the region of MWK 44,000 based (USD 60) on income from four wired connections to co-located micro-enterprises and income of roughly MWK 4,000 (USD 5) per month from battery and phone charging services.



*Most Malawian MSMEs could not afford to rent standalone solar home systems capable of powering refrigerators, basic appliances and shop lighting at a monthly price of between MWK 15 000 and MWK 20 000 (USD 20 to USD27).*

34 Frame et al., "Experiences from deploying solar PV energy businesses in rural Malawi," 16.

35 Frame et al., "Experiences from deploying solar PV energy businesses in rural Malawi," 16.

The focus of the community energy businesses introduced under the SOGERV project was to provide a local supply of renewable energy technology products for households but also to supply a range of options for small Productive Use of Energy (PUE) businesses. Each of the community energy supply businesses operated a 'Charging Station' (alternatively called a Kiosk) powered by a 4 kW PV array and provides a range of battery charging services, 'wired' small business connections, Solar PV system rentals and Portable Solar Product (PSP) sales. To size the market, SOGERV administered a custom survey in each of the four rural communities covering a total of 314 households and 46 businesses. Businesses rated, on a scale of 1 to 5 (from very likely to unlikely), whether they felt there would be any demand in that community for a predefined list of services that require electricity as input. Households rated how likely they would be to pay for these services.<sup>36</sup>

The survey results allowed the authors to match services which businesses believed there would demand for. These include mobile phone charging, cold drinks, battery charging, entertainment, barbershop, metal shop and shop lighting. There was also joint interest in agricultural refrigeration in one of the four communities.<sup>37</sup> This implied that there was a demand for businesses that were equipped with solar-PV systems that can deliver battery charging services, refrigeration, television and other forms of electronic entertainment and well-lit shops and barbershops. There was more limited demand for energy solutions for metalwork and agri-refrigeration. Based on this outcome each community established an energy supply business (ESB) equipped with a 4 kW solar PV array. The ESBs provided a mobile phone and battery charging services and facilitated the sale of portable solar products (e.g. lanterns and SHS), mobile phone charging, and battery charging. The ESBs were also equipped to supply 'wired connections' for monthly fees to a small number of neighbouring businesses.<sup>38</sup>

In the communities of Mandrade and Kandeu, ESBs leased stand-alone solar PV systems to local businesses for a monthly cost of between MWK 15,000 and MWK 20,000 (USD 20 to USD 27).<sup>39</sup> In Mandrade three businesses rented a system. One failed to maintain payments and the others complained that it was too expensive. In Kandeu two businesses signed up for systems, but both failed to maintain payments. Each ESB was able to secure only two to three co-located businesses willing to pay MWK 10,000 per month for a wired connection. Customers included barbershops, video show suppliers and a cold drinks kiosk.<sup>40</sup> Based on this experience, ESBs established in Gola and Thendo opted to supply only wired connections to co-located businesses. Six businesses signed up for wired connections (Gola and Thendo combined) at MWK 10,000 (USD 14) per month. The businesses included two barber shops, two cold drinks kiosks, a grocery kiosk and a video show supplier.<sup>41</sup>

36 Frame et al., "Experiences from deploying solar PV energy businesses in rural Malawi," 4.

37 Frame et al., "Experiences from deploying solar PV energy businesses in rural Malawi," 4.

38 Frame et al., "Experiences from deploying solar PV energy businesses in rural Malawi," 5.

39 Frame et al., "Experiences from deploying solar PV energy businesses in rural Malawi," 14.

40 Frame et al., "Experiences from deploying solar PV energy businesses in rural Malawi," 14.

41 Frame et al., "Experiences from deploying solar PV energy businesses in rural Malawi," 14.



## Acronyms and abbreviations

AECF	African Enterprise Challenge Fund
EGENCO	The Electricity Generation Company Limited
ESB	Energy supply business
ESCOM	The Electricity Supply Commission of Malawi
ESMAP	The world Bank Energy Sector Management Assistance Program
DfID	Department for International Development
GDP	Gross Domestic Product
GOGLA	Global association for the off-grid solar energy industry
IDA	International Development Association
IPPs	Independent power producers
ITU	International Telecommunication Union
kW	Kilowatt
kWh	Kilowatt-hour
LDCs	Least Developed Countries
LPG	Liquid petroleum gas
MAP	The UNCDF Making Access Possible programme
MAREP	The Malawi Rural Electrification Program
MEGA	Mulanje Electricity Generation Agency
MERA	Malawi Energy Regulatory Authority
MFI	Microfinance institution
MNOs	Mobile network operators
MSME	Micro, Small and Medium sized enterprise
MV	Megavolt
MW	Megawatts
MWK	Malawian Kwacha (national currency)
PayGo	Pay-as-you-go
PPP	Purchasing Power Parity
PSP	Portable Solar Product
PUE	Productive Use of Energy (business)
RBF	Results-based financing
REIAMA	The Renewable Energy Industries Association of Malawi
SACCO	Savings and Credit Cooperative Organization
SADC	Southern African Development Community
SAPP	Southern African Power Pool
SCP	Standard consumption package
SDGs	Sustainable Development Goals
SEforALL	The Sustainable Energy for All programme
SHS	Solar home systems
SOGERV	The Sustainable Off-Grid Electrification of Rural Villages Project
UN	United Nations
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VAT	Value-added tax
VSLA	Village Savings and Loans Association
WHO	World Health Organization
Wh	Watt-hour
Wp	Watt peak

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## About the UNCDF

The UN Capital Development Fund makes public and private finance work for the poor in the world's 47 least developed countries (LDCs). UNCDF offers "last mile" finance models that unlock public and private resources, especially at the domestic level, to reduce poverty and support local economic development. UNCDF's financing models work through three channels: (1) inclusive digital economies, which connects individuals, households, and small businesses with financial eco-systems that catalyze participation in the local economy, and provide tools to climb out of poverty and manage financial lives; (2) local development finance, which capacitates localities through fiscal decentralization, innovative municipal finance, and structured project finance to drive local economic expansion and sustainable development; and (3) investment finance, which provides catalytic financial structuring, de-risking, and capital deployment to drive SDG impact and domestic resource mobilization.



# 7 Affordable and Clean Energy

