

JANUARY 2019

## ENERGY EFFICIENCY BRIEF

# Malawi

## INTRODUCTION

Malawi lies in the southern tip of the great East African Rift Valley and shares borders with Tanzania, Mozambique and Zambia. It covers 118,484 square kilometres in area, of which 20% are water bodies. The country consists of 28 administrative districts. Its population, which is growing at 2.9% per annum since 2011, is estimated at 18.6 million in 2017 (World Bank, 2018a)<sup>1</sup> and projected to reach 26.6 million by 2030 (United Nations, 2017)<sup>2</sup>.

Like many other sub-Saharan countries, expanding access to modern energy is the top priority on the country's energy policy agenda and strategies for sustainable development. However, Malawi has a low electrification rate, estimated at 11% in 2016 (World Bank, 2018b)<sup>3</sup>. Over 80% of Malawians depend on traditional use of biomass. Energy efficiency measures could not only enable existing electricity supply to reach out to new customers and reduce peak power outages, but also save on expensive fuel imports and electricity generation capacity investment. As one of the Least Developed Countries with poverty levels of over 50% (World Bank, 2018a)<sup>1</sup>, energy efficiency measures could also result in direct energy and labour time savings among households.

The Department of Energy Affairs (DoEA), in the Ministry of Energy and Mining, is responsible for energy policies, strategies and plans while the regulations are under Malawi Energy Regulatory Authority (MERA). The country has two utility companies. The Energy Generation Company of Malawi (ENGECO) looks after generation while the Electricity Supply Corporation of Malawi (ESCOM) takes care of transmission/distribution. Some independent power producers (IPPs) are undertaking feasibility studies to enter the electricity generation market.

Malawi's National Energy Policy (NEP) was published in 2003 and the associated energy law was enacted in 2004. Together they set in motion direction for a holistic use of resources and promoting diversification



## MALAWI'S INTERNATIONAL PARTNERSHIPS AND COMMITMENTS RELATED TO ENERGY EFFICIENCY

Malawi is a member of the Southern African Development Community (SADC) and the Southern African Power Pool (SAPP) and committed to the SADC energy protocols;

Malawi has submitted both a generic NAMA<sup>4</sup> on mitigation options in various sectors and its first NDC to the UNFCCC; Currently it is finalising its SEforALL Action Agenda and Investment Prospectus with support from the African Development Bank;

Malawi is promoting clean cook stoves with support from the Global Alliance for Clean Cookstoves (GACC), the USAID and other development partners.

A revised National Energy Policy, which is waiting for government approval, will provide direction for both energy diversification and energy efficiency.

Figure 1: Total Energy Demand (2008)<sup>5</sup>

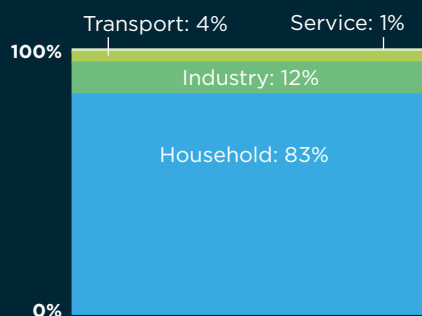


Figure 2: Electricity Demand Projection to 2030<sup>6</sup>

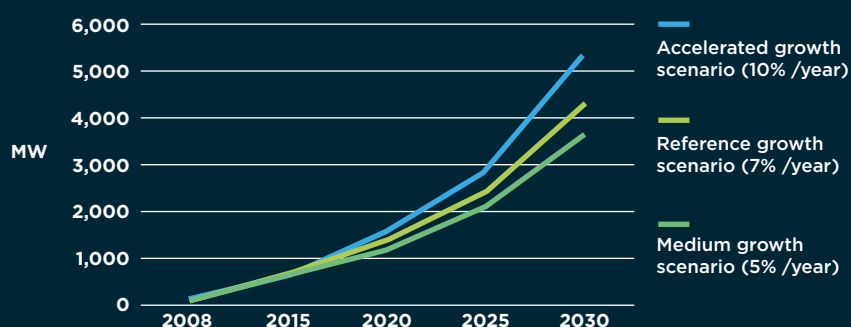


Table 1: Malawi's energy access and renewable energy statistics

Series	2000	2010	2014
Access to electricity (% of population)	4.8%	8.7%	11.9%
-Urban (% of urban population)	28.7%	34.7%	46.1%
-Rural (% of rural population)	1%	3.5%	4.7%
Access to clean fuels and technologies for cooking (% of population)	2.0%	2.7%	3.2%
Population, total	11.2 Million	14.8 Million	16.7 Million
Renewable energy consumption (% of total final energy consumption)	82.5%	79.7%	80.6%
Renewable electricity output (% of total electricity output)	84.3%	91.1%	91.4%

Source: World Bank (<https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>)

of energy sources and supply. A new and more inclusive energy policy has been drafted and is awaiting approval. During 2012-2016, the DoEA implemented a Sustainable Energy Management Project (SEMP) that aimed at facilitating a significant shift from direct burning of wood to cleaner, safer and sustainable use of modern energy in Malawi.

As indicated in Figure 1, household sector dominates energy consumption in Malawi, followed by the industrial sector. One main reason behind this is the low access to electricity and modern clean fuels (see Table 1). The government's efforts to move Malawians up the energy ladder have achieved limited effects, due to various challenges such as low electricity generation capacity and inability of the majority to afford alternative energy sources (Malawi, 2017)<sup>7</sup>. Figure 2 shows projected demand under three scenarios of 5%, 7% and 10% annual economic growth.

## TRANSPORT SECTOR

Administratively, the Department of Energy Affairs and the Malawi Energy Regulatory Authority are in charge of fuel policies and regulations respectively, while the Department of Transport (DoT) is in charge of transport infrastructure and planning.

### CURRENT STATUS

Transport medium-term developmental plans are articulated in the Malawi Growth and Development Strategy (MGDS), which focuses on improving the operational efficiency of the transport subsectors (road, rail, water and air) and road infrastructure. Since Malawi is a landlocked country, road transport plays a vital role for freight transport and the country's imports and exports. As for public transport, Malawi used to have a reliable urban and rural bus service system; but since the services were privatised, the bus system has been dysfunctional. Minibuses are the main vehicles for both intercity and urban public transport services, causing congestion and air pollution in cities and downtown areas. The coverage of railway services are limited and restricted to freight transport and rail passenger routes are rare.

### EXISTING INITIATIVES

The government continues to improve the conditions of the main national, regional, and municipal roads to ensure efficient movement of people and goods. Malawi used to be vulnerable to fuel shortages but the government has built up fuel reserve and storage facilities in all the regions to ensure fuel security.

Malawi is one of the early adopters of production and use of ethanol as fuel, following E20 standard. It has successfully tested 100% ethanol cars and has been making efforts to import fuel conversion kits to encourage ethanol fuel usage. There are also some interests in producing biodiesel from jatropha seeds. The country still lacks infrastructure for pure biofuel fuel distribution.

Malawi, like other countries in the SADC region, has been a 'dumping place' for used vehicles from Europe and Asia. To change this, the government has introduced some regulation and fiscal incentives to restrict the import of used vehicles.

- The Road Traffic Act requires all road vehicles to undergo fitness inspection, keep a valid certificate of fitness, and meet safety requirements;
- Older cars and cars of bigger engine sizes are required to pay much higher custom duties when they are imported.

### PRIORITY OPPORTUNITIES

- Promote non-motorised transport. There is an upsurge in the use of bicycle taxis in the urban centres and rural areas. Building of dedicated routes and improvement of road safety could effectively address the major concerns for the users and promote non-motorised transport;
- Improve the public transport system. There is need to reform and improve public bus transport services in the urban areas and regulate the use of minibuses in city centres. The NDC for Malawi target is to increase the number of passengers using mass transport from 1% to 30%; and
- Build appropriate infrastructure for ethanol distribution is a necessary prerequisite for promoting the use of biofuels for private and public transport in the cities.



## BUILDINGS SECTOR

With the exception of a few areas lying in the rift valley, most parts of Malawi have a daily temperature between 16 and 26 °C around the year and the need for space heating and cooling is low. All buildings in urban areas are required to meet local standards for building material types (brick and mortar, iron roofed etc.) and safety. However, traditional houses and houses built outside the jurisdiction of urban councils are not required to meet any government standards. The government owns a number of public buildings, including office complexes, hospitals, universities, colleges and schools. These buildings were not designed and built in accordance with any energy efficiency standard. They could be good candidates for energy efficiency measures such as energy efficient lighting, improved institutional stoves, domestic stoves and solar water heaters.

### CURRENT STATUS

Biomass accounts for over 80% of the national energy supply in Malawi, mainly used for cooking and water heating and the majority of cookstoves are inefficient traditional ones. Firewood collection is usually done by women and involves long-distance walking and carrying. Thus improvement in cookstove efficiency could significantly reduce the workload on women and eliminate associated indoor and outdoor air pollution and their impacts on human health. Battery dry cell torches are the most important fuel for lighting (75%), followed by electricity (11%), and the remainder are candles and wood (Malawi, 2017)<sup>7</sup>. Inefficient incandescent bulbs are still widely used and sold in the country.

### EXISTING INITIATIVES

- Promotion and awareness raising on the use of CFLs and LEDs by ESCOM with support from various development partners; and
- Promotion and awareness raising on improved rocket stoves for school children feeding programmes supported by various agencies;
- Dissemination of 2 million improved biomass stoves for households with support from the United Kingdom.

### PRIORITY OPPORTUNITIES

Despite the existence of some EE initiatives, the lack of policies, laws and standards are barriers to energy efficiency improvement for the building sector. Replacing incandescent bulbs with more efficient compact fluorescent lights (CFLs) and light emitting diodes (LEDs) can help reduce the evening system peak demand and alleviate electricity supply shortage. The priority opportunities in this subsector include:

- Introduce energy efficiency standards and labelling for lighting bulbs and cook stoves to ensure availability of high quality equipment and components in the market place;
- Develop energy performance codes for buildings to ensure energy efficiency measures are embedded in building design, construction, and retrofit;
- Raise awareness and build capacity for practitioners and government institutions on energy efficiency policies and measures to ensure EE measures are mainstreamed regular plans and activities.

## INDUSTRY SECTOR

Malawi's economy is based on agriculture, which accounts for about 30% of the country's GDP. The industrial sector is still small but growing and it includes the production and processing of sugar, tea, plastics, food and beverage, packaging materials, pharmaceuticals, wood and metal products, cement, and clothing. Industrial customers are defined as those clients who have a power rating of at least 50kW. Although industrial customers only account for 0.4% of the total number of electricity consumers, they consume 47% of the electricity generated in Malawi (Gamula, Hui, and Peng, 2013)<sup>5</sup>. The industrial sector also uses large quantities of solid and liquid fossil fuels. Coal is the main energy source for process heating such as cement kilns, industrial boilers and tobacco kilns. Industries also use large quantities of diesel for standby power generation due to frequent power rationing (Gamula, Hui, and Peng, 2013)<sup>5</sup>.

### CURRENT STATUS

Although Malawi benefited from a Canadian funded industrial energy management programme for southern African countries in the mid-1990s that focused on human capacity building, the uptake of energy efficiency and energy conservation activities among industries is rare. According to the Malawi Confederation of Chambers of Commerce and Industry (MCCCI), which covers most of the industries in Malawi, the energy efficiency levels of industries are low and only a small share of industrial enterprises are taking energy efficiency and energy conservation actions.

### EXISTING INITIATIVES

The electricity utility company, ESCOM, has been implementing a number of demand-side management (DSM) programmes to encourage energy conservation among its industrial customers. Some of the measures promoted by the ESCOM are:

- Maximum demand metering and charges;
- Prepaid electricity metering;
- Time-of-use tariffs;
- Off-peak tariffs; and
- Awareness on DSM and energy efficiency
- Energy management courses to engineering students at the University of Malawi.

Malawi Polytechnic, a constituent college of University of Malawi, includes energy management in its regular engineering degree programmes.

### PRIORITY OPPORTUNITIES

- Implement targeted programme to raise awareness of energy efficiency opportunities in key industrial sectors through energy audit and demonstration projects and the coordination of MCCCI;
- Offer training and education programmes to build the energy audit and management capacity among technicians and management staff;
- Establish minimum energy efficiency standards for key energy-intensive industrial processes and industrial products and regularly tighten the standards.

<sup>1</sup> World Bank, 2018a. World Bank Development Indicators database. Available at <http://datatopics.worldbank.org/world-development-indicators/>

<sup>2</sup> United Nations, 2017. World Population Prospects: The 2017 Revision, Key Findings and Advance Tables. Working Paper No. ESA/P/WP/248. United Nations, Department of Economic and Social Affairs, Population Division.

<sup>3</sup> World Bank, 2018b. World Bank, Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program. Available at: <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>

<sup>4</sup> Apart from the 3-pager short version of the NAMA on the UNFCCC website, a longer version is available at <https://cepa.rmpportal.net/Library/governmentpublications/nationally-appropriate-mitigation-actions-for-malawi-2015>

<sup>5</sup> Gamula, G. E. T., Hui, L., Peng, W., 2013. "An Overview of the Energy Sector in Malawi". Energy and Power Engineering, 2013, 5, 8-17.

<sup>6</sup> Taulo, J. L., Gondwe, K.J., Sebitosi, A.B., 2015. "Energy supply in Malawi: Options and issues". Journal of Energy in Southern Africa. 2015,26 (2). Cape Town, May 2015. On-line version ISSN 2413-3051, Print version ISSN 1021-447X

<sup>7</sup> Malawi, 2017. Republic of Malawi - Integrated Household Survey 2016-2017. Household Socio-Economic Characteristics Report. November 2017.

## CROSS-CUTTING ISSUES

To speed and scale up energy efficiency investment and actions need, a long list of cross-cutting issues need to be addressed, this includes:

- ✓ Establish and harmonize the relevant laws, national plans and policies, as well as codes and standards to encourage the choice and use of energy efficient products and services and ban the market entry of inefficient products;
- ✓ Integrate energy efficiency improvement in the government investment and development plans and strategies;
- ✓ Offer energy efficiency training in education institutions and industrial associations;
- ✓ Raise awareness to policy makers, industrial partners and the general public; and
- ✓ Provide linkage and collaborative engagements between international and local experts in non-motorised transport, Solar water heating technology, building codes, EE equipment standards and labelling, energy audits, EE policy and regulations.

The Copenhagen Centre on Energy Efficiency functions as the global thematic Energy Efficiency Hub of Sustainable Energy for All (SEforALL), and accordingly works directly to support the SEforALL objective of doubling the global rate of improvement in energy efficiency by 2030.

The Copenhagen Centre fulfils its mission through:

- assisting policy change in countries and cities, with knowledge, insights and technical support
- accelerating action through innovation in project development and finance
- raising the profile of energy efficiency by communicating success stories and supporting outreach.

For more information, please visit [www.energyefficiencycentre.org](http://www.energyefficiencycentre.org) or contact us at [c2e2@dtu.dk](mailto:c2e2@dtu.dk)

Regarding our work in Malawi, please contact Xianli Zhu from the Copenhagen Centre at [xzhu@dtu.dk](mailto:xzhu@dtu.dk) or Kenneth J Gondwe from the University of Malawi at [kgondwe@poly.ac.mw](mailto:kgondwe@poly.ac.mw)

Visit Copenhagen Centre's Knowledge Management System at [kms.energyefficiencycentre.org](http://kms.energyefficiencycentre.org)

## PRIORITY OPPORTUNITIES

The grid's overall transmission losses are estimated to be currently 21%, of which 14% are technical losses (Taulo, Gondwe, and Sebitosi, 2015)<sup>6</sup>. The loss rates are much higher than the levels in developed countries and many developing countries. The high transmission and distribution loss means enormous waste of electricity, a valuable resource that could be used to increase electricity access and improve people's living standard. It is imperative to take effective actions to reduce transmission and distribution losses/ inefficiencies through the rehabilitation of transmission lines and substations.

## CONCLUSION

Through supports from multiple donors, Malawi is improving its policies, plans, standards and general capacity to implement energy efficiency and energy conservation measures in the various sectors. With the finalisation of its Energy Policy revision, SEforALL Action Agenda and Investment Prospectus, Malawi could benefit from the experiences of other countries in the region and collaborating with international partners such as Copenhagen Centre on Energy Efficiency in speeding up its energy effective improvement. Considering the different situations of each sector, this country brief has identified some concrete priority areas for energy efficiency actions. In particular, the following sector specific and cross-cutting issues will be critical for the successful design and implementation of its energy efficiency measures:

### Transport

- ✓ There is potential to develop energy efficiency and energy conservation measures in the areas of non-motorised transport, mass bus transit system and commercialisation of biofuels (ethanol and biodiesel).

### Buildings

- ✓ Malawi needs to promote energy efficiency in the built environment through development building codes and minimum performance standards for appliances.

### Industry

- ✓ Accelerate and upscale energy efficiency actions among industries through promotion of energy efficiency standards, energy audit, and energy management.

### Cross cutting issues

- ✓ Create a supportive and stable long-term policy environment to for energy efficiency investment and actions;
- ✓ Integrate energy efficiency improvement in the government investment and development plans and strategies;
- ✓ Raise awareness and training of technicians and practitioners;
- ✓ Increase international cooperation and see more international support.