MALAWI GOVERNMENT

Ministry of Natural Resources, Energy and Mining

Department of Energy Affairs

CONSULTANCY SERVICES TO CARRY OUT MALAWI ENERGY POLICY REVIEW

DRAFT NATIONAL ENERGY POLICY

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FOREWORD

The National Energy Policy herein is a culmination of a wide consultation process that took into account a variety of views from various stakeholders. This policy is a revision of the 2003 National Energy Policy. The revision of the policy was necessitated by several factors and among them included: (a) That the previous policy, in spite of its successes, had a number of shortfalls or challenges which needed to be rectified; (b) Whilst the previous policy was driven by the Vision 20-20 and the Millennium Development Goals the development agenda has moved on and the MDGs have given way to the Sustainable Development Goals (SDGs) and that the main development agenda for Malawi now is the Malawi Growth and Development Strategy II, both of which have put energy as a high priority area; (c) In 2015 the Government adopted a power marketing policy as well as an oil importation policy both of which needed to be factored into the new energy policy; (d) The SE4ALL of 2011 emphasises issues of access to energy for all agenda which again needed to be reflected in the new Energy Policy; (e) Recently Government has adopted a Public Sector Reform Programme aimed at ensuring efficiency, transparency, and accountability in the delivery of public services of which energy is a part. All these have provided the rationale for the review of the policy.

The Energy Policy has been reviewed in the context of two important policy declarations of the Government. These are the Power Market Restructuring and the Fuel Importation System. Under the Power Market Restructuring the sole power utility in Malawi, ESCOM, will be unbundled by creating two companies out of ESCOM one of which will be dealing with Generation whilst the other will be dealing with Transmission and Distribution. Independent Power Producers would then be encouraged to come and invest in additional generation and compliment ESCOM generation to satisfy the power needs of the country. The Transmission and Distribution Company in additional to operating the distribution network and selling power to consumers will own and maintain the transmission lines and carry out the function of system operator and single buyer of power.

Under the new Fuel Importation System, importation of fuels shall be done through annual transparent tenders floated by NOCMA in liaison with the Ministry of Natural Resources Energy and Mining, in order to allow any company licensed in Malawi to participate in the tenders to supply liquid fuels. The supplier shall deliver the product at the designated NOCMA storage facilities, and NOCMA shall take custody of the product only after delivery by the supplier. Malawi has adopted a system of bulk procurement of fuel through NOCMA and the newly built fuel storage facilities shall be used as inland dry ports in Malawi. All licensed OMCs, including filling station owners with licensed oil tankers, will obtain fuel from these inland ports.

The Energy Policy emphasises the importance of private sector participation in the sector and provides a conducive environment for such participation be it in the form of direct investment, PPPs, IPPs or other participation vehicles. It also emphasises on sustainable and clean energy which is accessible to all. Energy efficiency is another priority area of the energy policy. It also recognises the importance of security of energy supply systems. Mitigating

environmental, safety and health impacts of energy production and utilization is a key part of the policy. All this will be done under a robust, investor friendly and consumer sensitive regulatory regime.

The overall goal of the policy is access to affordable, reliable, sustainable, efficient and modern energy for all Malawians by 2030.

Hon Bright Msaka, SC, MP

Minister of Natural Resources, Energy and Mining

PREFACE

The process of developing the policy was very consultative. A lot of groups, organisations, individuals and other stakeholders were consulted either individually, in groups or at regional and national workshops. PricewaterhouseCoopers were engaged to facilitate the policy review process and led in the consultations process. Some of the consultations included meetings and several workshops with various stakeholders including the Task Force. There were also regional workshops with stakeholders in all the three regions in Malawi as well as meetings with Parliamentary Committees and Principal Secretaries to obtain views and inputs on the policy. The policy was also discussed at Cabinet level before being approved. Appendix3 attached hereto is a list of the stakeholder groups that were consulted. It is hoped that such consultative process will ensure ownership of this policy. It is realised however that such wide consultative processes cannot achieve consensus on every aspect of the policy but what is important is that all views were taken into account.

In addition to this process some members of the Task Force and some of the consultants went on a study tour of Zambia and Kenya to study and learn from these countries about their energy policy systems. The lessons learnt greatly enriched the process. The consultants further conducted desk studies of various countries' energy policies and systems in Africa and Asia. Lessons learnt from these countries have further enriched the process and outcome of the policy.

There are great opportunities for implementing the policy. The policy strongly advocates for the private sector to take a leading role in the implementation of the policy and programmes there under. There are also a number of opportunities for NGOs, Communities and other partners to participate in the implementation of the policy. There are a number of challenges as well which could hamper implementation including funding and technical support. It is hoped however that with this new policy being supported by an equally attractive legal and regulatory environment various traditional and non-traditional sources of funding could be accessed.

The process of developing the policy was led by the Department of Energy who headed a Task Force of various stakeholders such as MERA, ESCOM, NOCMA, OPC Policy Section and MCA and we are grateful to this team which worked extremely hard. We also thank UNDP who provided funding for the study. The development of the policy was facilitated by PricewaterhouseCoopers consultants.

K. Kaphaizi

Principal Secretary,

Ministry of Natural Resources, Energy and Mining

ACRONYMS

AfDB	African Development Bank
AUC	African Union Commission
CA	Catchment Area
CDB	China Development Bank
CDM	Clean Development Mechanism
CO	Carbon Monoxide
CO2	Carbon Dioxide
COCO	Company Owned Company Operated
CODO	Company Owned Dealer Operated
COLEDO	Company Leased Dealer Operated
COMESA	Common Market for East and Southern Africa
CSI	Coal Supply Industry
DfID	Department for International Development
DoE	Department of Energy
DODO	Dealer Owned Dealer Operated
DSM	Demand Side Management
EAPP	East African Power Pool
EDVP	Ethanol Driven Vehicle Project
ESI	Electricity Supply Industry
ESCOM	Electricity Supply Corporation of Malawi
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESSP	Energy Sector Support Project
ETHCO	Ethanol Company of Malawi
FDI	Foreign Direct Investment
GenCO	Generation Company
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GoM	Government of Malawi
GTF	Global Tracking Framework
ICA	Investment Climate Assessment
IDA	International Development Association

IEA	International Energy Agency
IFC	International Finance Corporation
IHPS	Integrated Household Panel Survey
IPP	Independent Power Producer
JICA	Japanese International Cooperation Agency
kV	Kilo Volt
kWh	Kilo Watt hour
LDC	Least Developed Country
LED	Light Emitting Diodes
LF	Liquid Fuel
LF&GSI	Liquid Fuel and Gas Supply Industry
LPG	Liquid Petroleum Gas
MAREP	Malawi Rural Electrification Programme
MBS	Malawi Bureau of Standards
MCC	Millennium Challenge Corporation
MDG	Millennium Development Goals
MERA	Malawi Energy Regulatory Authority
MGDS	Malawi Growth & Development Strategy
MIGA	Multilateral Investment Guarantee Agency
MNREM	Ministry of Natural Resources, Energy and Mining
MVA	Mega Volt Ampere
MW	Mega Watt
MWK	Malawi Kwacha
NCST	National Commission for Science and Technology
NEPAD	New Partnership for Africa's Development
NPCA	NEPAD Planning and Coordinating Agency
NEP	National Energy Policy
NGO	Non-Governmental Organization
NOCMA	National Oil Company of Malawi
NSO	National Statistics Office
OMC	Oil Marketing Company
PCG	Partial Credit Guarantees
PCL	Press Corporation Limited
PIL	Petroleum Importers Limited

PIDA	Programme for Infrastructure Development in Africa
PIDA-PAP	PIDA Priority Action Program
PRG	Partial Risk Guarantees
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PSP	Pico Solar Products
PwC	PricewaterhouseCoopers
REA	Rural Electrification Agency
RE	Renewable Energy
RER	Renewable Energy Resources
RET	Renewable Energy Technologies
ROWs	right of ways
SADC	Southern Africa Development Community
SAPP	Southern Africa Power Pool
SDGs	Sustainable Development Goals
SE4All	Sustainable Energy for All
TDC or T&D	Transmission and Distribution Company
UN	United Nations
UNCB	United Nations Convention on Biodiversity
UNCD	United Nations Convention on Desertification
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USD	United States Dollar
VAT	Value Added Tax
WEO	World Economic Outlook

ENERGY MEASUREMENT AND CONVERSION TABLES

1. Prefixes for SI Units

PREFIX	SYMBOL	POWER (10^n)	PREFIX	SYMBOL	POWER (10^n)
Exa	E	18	deci	d	-1
Peta	P	15	centi	c	-2
Tera	T	12	milli	m	-3
Giga	G	9	micro	□	-6
Mega	M	6	nano	n	-9
Kilo	K	3	pico	p	-12
Hecto	H	2	femto	f	-15
Deca	D	1	atto	a	-18

2. Conversion Factors for Different Energy Sources

FUEL TYPE	NATURAL UNIT	DENSITY (TONNES/M3)	CONVERSION FACTORS (HEATING VALUES)
Malawi Coal	Tonne	n/a	24.9 GJ/T
LPG	Tonne	0.54	45.5 GJ/T
Gasoline	Tonne	0.74	44.0 GJ/T
Jet Fuel	Tonne	0.83	43.2 GJ/T
Paraffin	Tonne	0.83	43.2 GJ/T/ 35MJ/Litre
Diesel	Tonne	0.87	42.5 GJ/T
Ethanol	Tonne	0.78	16.54 GJ/T
Electricity	GWh	n/a	3600 GJ/GWh
Wood	m3	0.71	11.4 GJ/ M3
Charcoal	Tonne	n/a	33.1 GJ/T
Biomass	Tonne	n/a	13.3 GJ/T

Bagasse	Tonne	N/A	7.8 MJ/kg

3. Derived SI Units of Measurement

DIMENSION	UNIT	SYMBOL
Area	Square metre	m2
Volume	Cubic metre	m3
Speed	Metre per second	m/s
Acceleration	Metre per square second	m/s2
Frequency	Hertz	Hz (=l/s)
Pressure	Pascal	Pa (= N/m2)
Volume Flow	Cubic metre per second	M3/s
Mass Flow	Kilogram per second	Kg/s
Density	Kilogram per cubic metre	Kg/m3
Force	Newton*	N (= kg.m/s2)
Energy	Joule**	J (=N.m)
Power	Watt	W (= J/s)
Energy Flux	Watt per square metre	W/m2
Calorific Value	Joule per kilogram	J/kg
Specific Heat	Joule per kilogram Kelvin	J/kg.K
Voltage	Volt	V (=W/A)

Notes:

* **The force exerted by a mass of 1 kg equals 10 N**

** **1 J = 1 W.s.**

4. Conversion of Non-SI Units for Energy

NON-SI UNITS FOR ENERGY	SYMBOL	EQUIVALENT IN SI UNITS
Erg	Erg	10-7 J
Foot pound force	Ft.lbf	1.356 J
Calorie	Cal	4.187 J
Kilogram-force metre	Kgf.m	9.8 J
British Thermal Unit	Btu	1.055 x 103 J

Horse power hour (metric)	hp.hr	2.646 106 J
Horsepower hour (British)	Hp.hr	2.686 x 106 J
Kilowatt hour	KWh	3.60 x 106 J
Barrel of oil equivalent	b.o.e.	6.119 x 109 J
Tonne of wood equivalent	t.w.e	9.83 x 109 J
Tonne of coal equivalent	t.c.e.	29.31 x 109 J
Tonne of oil equivalent	t.o.e.	41.87 x 109 J
Quad (Pbtu)	-	1.055 x 1018 J
Terawatt year	Twy	31.5 x 1018 J

INTRODUCTION

1.1 Background

In Malawi like any other country, energy is the main driver of economic growth; improving delivery of social services; creating investment and employment opportunities; and reducing poverty. The country has identified energy as a priority sector in order to spur development in other sectors such as Agriculture and Industry, two sectors which contribute about 50% of the National GDP of Malawi (the contributions from Agriculture and Industry are 33% and 19% respectively). Improvements in the energy sector are expected to positively impact on other sectors, through well-defined policies and institutional frameworks, international assistance from development partners and partnerships with the private sector.

The Ministry of Natural Resources, Energy and Mining (MNREM) provides policy direction and guidance on the sustainable development and utilization of energy sources in Malawi, while the Malawi Energy Regulatory Authority (MERA) is mandated to, among other functions, regulate utilization of energy sources.

In recognition of this, the GoM through the MNREM, prepared a National Energy Policy (NEP) in January 2003. The motivation for the NEP was founded on the following three main considerations:

1. Developments in the energy sector have an important bearing on the success of economic development initiatives in the country.
2. Although Malawi is relatively well endowed with potential energy resources (biomass, coal, hydro, wind and solar energy), their full potential is far from being realized. A number of structural and institutional challenges must be overcome to unlock this potential.
3. While planning is essential to formulating policy for energy, globally the approach to planning has taken a paradigm shift over the past two to three decades. The role of the Government has changed from direct investment and control to policy formulation and governance. A greater reliance on market arrangements, competition and private sector participation will make a big impact.

The GoM has noted that while some considerable success has been attained in reforming and expanding the energy sector since the time the 2003 NEP was developed, a lot still remains to be done if the energy needs of all Malawians are to be met. The 2003 Energy Policy did not include an implementation plan to guide programmatic activities and there were no specific monitorable targets set. Hence success was limited. A new policy rectifying these challenges needed to be put in place. The 2003 policy was promulgated after the Millennium Development Goals were put into place. However the MDGs did not have any specific goal on energy. Thus an important element in development was omitted. The new UN Social Development Goals which have been put into place has included energy as goal No. 7. The new policy has taken this into account. In addition the SE4ALL of 2011 means the old policy had to be reviewed in order to factor in these aspects in the new policy.

This new energy policy focuses on the following issues:

i. Sustainable and reliable energy provision for industrialisation and modernisation of the Malawi economy and the general population. The new policy will catalyse the provision of sustainable and reliable energy services through strategies that will support new industries as well as assist in modernising old ones.

ii. Energy is a key driver of the Malawi economy. The new policy will therefore ensure that strategies are put in place to support rapid growth of the productive sectors such as agriculture, manufacturing, mining and the service sector.

iii. Energy access to the majority of Malawians will be addressed in line with the SE4ALL. The new policy will come up with new strategies for addressing energy access issues. The new United Nations Sustainable Development Goals (SDGs) include access to affordable, reliable and modern energy services for all as Goal No. 7 to be achieved by 2030. This is consistent with the UN agenda of Sustainable Energy for All by 2030, pursued since 2011.

iv. Energy pricing issues will be addressed. In order to encourage more private sector participation in energy production, the new policy will come up with strategies that will ensure cost reflective pricing with internationally acceptable returns on investment. This will include automatic price adjustment mechanisms for all sources of energy.

v. Regional integration and international cooperation: Malawi is currently not interconnected to the regional grids of the SAPP and the EAPP. The new policy will address this gap.

vi. Energy and climate change: this issue requires more attention. The 2015 floods gave a clear warning that this issue must be taken seriously.

vii. While the new policy has recognised that biomass is still an important source of energy for the majority of Malawians, emphasis in the new policy, however, will be to modernise energy services at household level through promotion of alternative sources of energy, e.g. gas for cooking and solar energy for lighting. Efficient biomass stoves and biomass briquetting will also be promoted.

viii. Decentralisation of the Department of Energy: Government will endeavour to decentralise the Department of Energy and to have officers in the districts.

ix. Finally another area that needs special attention is the social and gender commitments of the NEP. The 2003 NEP successfully identified the importance of social and gender perspectives in both the supply and demand dynamics of the sector but did not differentiate the respective needs and usage of energy of men and women or their specific challenges in accessing energy sources. Much as the 2003 policy mentions that gender will be mainstreamed in the planning and implementation of energy programs, in practice, very few programs were developed in line with these strategies. In the new policy strategies will be developed to address the issues.

In view of the above, the GoM has decided to prepare a new version of the NEP that should reflect the latest developments and new national goals. In connection with the preparation of the NEP document, the GoM is emphasizing on the need to have a clear implementation plan with time-bound deliverables and capacity building in modern energy access, generation and delivery. The National Energy Policy, being the framework for the development of the energy sector in Malawi, should set out clear updated goals, objectives, strategies and priority actions.

1.2 Structure of the document

This energy policy document is divided into thirteen chapters. The first chapter is the Introduction, which gives the background to the policy in terms of historical and current

states of affairs, including existing challenges and Government responses to these as well as what the policy aims to achieve.

Chapter two deals with the context i.e. an analysis of the drivers of this policy, which include sustainable and reliable energy supplies, energy as a driver of the country's economic growth, energy access issues, energy pricing, as well as socio-economic and political issues. It also analyses the international development protocols and development commitments in relation to energy, regional commitments and agreements on energy, as well as the national context in terms of the development commitments in relation to energy, such as MDGs, Vision 2020, Gender and Legal frameworks, and Constitutional demands. All these have shaped the development of this National Energy Policy.

Chapter three deals with broad Policy Outcomes, Goals and Objectives. These are presented in general terms. Chapter four presents current and projected energy mixes and a brief situation analysis of the energy demand and supply options. The next seven chapters (five to eleven) contain actual policy statements, each dealing with one energy source or type. Each chapter is divided into two parts. The first part analyses the current status of that energy type in Malawi in terms of the main issues that require policy direction, while the second part lists a set of policy statements for that energy type. Chapter 5, which is on Electricity, has further been subdivided into subchapters on Generation, Transmission, Distribution, Rural Electrification and Renewable Energy.

Chapter twelve is dedicated to Demand Side Management with focus on electricity and biomass usage, while Chapter thirteen deals with institutional arrangements and linkages (roles and responsibilities of each institution). Implementation Plan with timelines for achieving the planned activities, and a Monitoring and Evaluation Plan are detailed in Appendix 1 and 2 respectively.

2.0 CONCEPTUAL CONTEXT

2.1 Social economic and political context

The Government understands that sustainable social and economic growth depends critically on access to modern and reliable energy. If access to energy is poor, it becomes very difficult to attract investment in any sector of the economy; and without investment flows, growth prospects are limited. As the World Bank's Vice President put it "*Access to energy is absolutely fundamental in the struggle against poverty … Without energy, there is no economic growth, there is no dynamism and there is no opportunity*."[1]

However, in much of the world, especially developing countries, access to energy remains low and women are more disadvantaged than men in terms of accessing energy and supply is often unreliable. At the same time, the world's energy choices are leading to levels of pollution that are substantially shortening people's lives and causing climate change. The energy and growth challenge requires identifying solutions to these problems of access to inexpensive and reliable energy, while limiting environmental damage and guarding against disruptive climate change.

Malawi is endowed with abundant renewable energy resources: hydro, solar, wind and other biomass (since wood is unsustainably exploited). Despite the fact that renewable energy sources have not made a significant contribution in the Malawi's energy mix, the Government has made significant progress with the support from bilateral and multilateral donor agencies. Malawi undertook a GEF funded Barrier Removal to Renewable Energy in Malawi (BARREM) project which is contributing towards changing the landscape of RES in the country. Awareness has improved substantially through media, pilot projects and training programmes.

2.2 National context

2.2.2 Demographics the Economy and the GoM Reform Agenda

According to the 2008 census the Malawi population was 9.9 million in 1998 and was projected to increase to 16.35 million in 2013. The annual growth rates in the Northern, Central and Southern Regions were 3.3%, 3.1% and 2.4% respectively. The overall growth rate was 2.8% according to the 2008 National Census. Urban population has been on the increase from about 850,000 in 1987 to 1.4 million in 1998 and to 2 million in 2008. The Rural population is estimated at 84.7% of the total population and is comprised mostly of small holder farmers, predominantly women.

Malawi is a Sub-Saharan African country that lies in a part of the world that frequently experiences climate change impacts. Malawi's vulnerability to climate change arises mainly from socio-economic, demographic and climatic factors.

[1] Rachel Kyte, Vice President and special envoy for climate change, World Bank

Malawi is one of the least developed countries in the world (in the bottom 10%) with a purchasing-power-parity (PPP) based Gross Domestic Product (GDP) per capita of about USD 780 in 2013. GDP composition by sector in 2013 was 27% Agriculture, 18% Industry and 54.2% Services.

Agriculture is the mainstay of Malawi's economy, and women contribute about 70% of the labour and yet most of their efforts go unnoticed. It supports 84.7% of the population residing in rural areas and accounts for 27% of the GDP, 90% of export earnings, and 46% of wage employment. Over 80% of the labour force is engaged in agriculture.

According to the Malawi Economic Report by the World Bank of 2014, an analysis of the IHPS data shows that the rate of incidence of poverty has fallen slightly from 40.2% in 2010 to 38.7% in 2013. However this level of poverty is considerably high by world standards. In addition World Development Indicators suggest income distribution is highly inequitable and has worsened from 2004 (0.4) to a national gini-coefficient of 0.46 in 2010.

In the above regard Malawi's vulnerability to climate change is due to a nexus between climate change which arises from a narrow economic base, limited agro-processing facilities, over dependency on rain-fed agriculture and on biomass for energy; and poverty which is exacerbated by drought, floods, natural disasters and population pressure. The result is adverse impact on food security, water availability and quality, and energy, overwhelmingly affecting sustainable livelihoods especially for rural communities. Malawi's population growth trajectory puts the population at 40 million in 2040 from 16.35 million in 2013. This will put considerable pressure on biomass if diversification away from biomass is not addressed and will in turn contribute to the severity of climate change effects.

The GoM, in an effort to reduce poverty and achieve sustainable economic growth, developed the Malawi Growth and Development Strategy (MGDS) in 2006. The MGDS was expected to transform the country from being a predominantly importing and consuming economy to a predominantly manufacturing and exporting economy. The 2003 NEP was premised on the Vision 2020 and MGDSI. However with the MGDSII it has been found important to revisit the NEP 2003 as these put energy in high priority. Going forward, the global energy agenda is being shaped by the Sustainable Energy for All (SE4All) agenda. The SE4All was launched in September 2011. The SE4All aims to achieve three main goals by 2030: Ensuring universal access to modern energy services; doubling the global rate of energy efficiency; and doubling the share of renewable energy in the global energy mix. In addition, the global energy agenda is in turn being shaped by the newly launched Sustainable Development Goals which puts energy as a high priority.[2] As such Malawi's Energy Policy has to be in sync with these developments on the world scene.

In line with these international developments as well as GoM's own prerogative under Public Sector Reforms aimed at improving efficiency, accountability and transparency in the delivery of services there have been new developments in the energy sector that need to be taken into account. These include the Power Market Restructuring and the Fuel Importation System. The power sector is well articulated and addressed by the NEP, 2003. The slow implementation of the act and lack of an approved strategy has affected the development of

[2] Sustainable Development Goals (SDGs) are a set of global targets that will replace the current Millennium Development Goals (MDGs)

the power sector. There is need for the Government to support the procedures of breaking up ESCOM into generation and transmission and distribution companies. Under the Power Market Restructuring the sole power utility in Malawi, ESCOM, is expected to be unbundled by creating two companies out of ESCOM, one dealing with Generation and the other dealing with Transmission and Distribution. Independent Power Producers would then be encouraged to come and invest in additional generation capacity to help satisfy the power needs of the country. The Transmission and Distribution Company in addition to operating the distribution network and selling power to consumers will own and maintain the transmission lines and carry out the function of system operator and single buyer of power.

Under the new Fuel Importation System importation of fuels is expected to be done through annual transparent tenders floated by NOCMA in liaison with the Ministry of Natural Resources Energy and Mining, in order to allow any company licensed in Malawi to participate in the tenders to supply liquid fuels. The supplier will be expected to deliver the product at the designated NOCMA storage facilities, and NOCMA shall take custody of the product only after delivery by the supplier. Malawi has adopted a system of bulk procurement of fuel through NOCMA and the newly built fuel storage facilities shall be used as inland dry ports and common user facilities in Malawi. All licensed OMCs, including filling station owners with licensed oil tankers, will obtain fuel from these inland dry ports and may use the said inland dry ports for storage purposes at a fee.

2.3.1 Energy Governance

In terms of governance, the overall mandate of the Ministry of Energy and Mining is to ensure the sustainable development, utilization, and management of mineral and energy resources for the socio-economic development of the country. The Department of Energy Affairs (DoE) under the Ministry of Energy and Mining provides policy direction for the energy sector. DoE's aim is to fulfil the policy objectives which are:

- improved efficiency and effectiveness of the commercial energy supply industries;
- improved security and reliability of energy supply systems;
- increased access to affordable and modern energy services;
- improved energy sector governance; and
- mitigation of environmental, safety, and health impacts of energy production and utilization.

In order to fulfil the policy objectives the DoE is expected to work closely with Department of Forestry for biomass utilization and Malawi Energy Regulatory Authority on regulation of the energy sector and Electricity Supply Corporation of Malawi on the generation, transmission and distribution investment. The DoE also works with Ethanol Company of Malawi and Press Cane on the production of ethanol fuel. There are NGOs which work with DoE on executing some projects and reviewing the energy policy such as Renewable Energy Industries Association of Malawi (REIAMA) and Electrical Contractors Association of Malawi. The DoE has recognized that the current energy policy has some shortfalls such that the targets which were set in 2003 have not been met including closer working arrangements. This revised energy policy intends to address such shortfalls.

All issues of electricity pricing and regulations are governed by MERA in collaboration with the Government through the DoE. The energy laws that govern the power sector are: Energy Regulation Act, No. 20 of 2004; Rural Electrification Act, No. 21 of 2004; Electricity Act, No. 22 of 2004.

2.3.2 Thermal Energy for households

The major source of thermal energy for households in Malawi is firewood and charcoal. The biomass energy subsector is unregulated since the majority of the rural population personally collect fuels for own use and do not directly attach a cost to it. However the Department of Forestry issues licenses upon proof that the source of firewood and charcoal is sustainable for those that would like to trade in biomass. There are no sources of forests that can be exploited sustainably by communities and they end up exploiting Government forests. As a result communities fail to obtain licenses in order to carry out biomass trading in form of firewood and charcoal. In this regard trading in biomass especially charcoal is deemed illegal. In consequence there are no efforts to promote, *inter alia,* efficient charcoaling kilns. Other sources such as electricity and LPG are mainly used in towns and cities for heating and cooking while solar thermal is used for water heating in both urban and rural areas.

The major barrier for access to modern energy for thermal applications is affordability as the majority of households are low income earners and as such they cannot afford modern energy applications which include electricity, gas, solar and use of efficient cook stoves.

2.3.3 Power Sector

ESCOM has the monopoly for generation, transmission and distribution of grid electricity despite the fact that the Law allows for the participation of independent power producers (IPPs). The country relies on one river for its power supply needs which could be disastrous for the economy in case drought affects that river more than others. There are however a few companies that produce electricity to meet part or all their energy needs such as Illovo Sugar.

Malawi's interconnected grid electricity is from hydro. The installed interconnected capacity of hydro is 351 MW which does not meet demand. At the time of formulating this policy there were frequent load shedding due to the low water levels in the Shire River. Government recognizes that this is not suitable for the economy. It is thus encouraging foreign companies to come and invest in the power sector. To this end the Government is carrying out detailed feasibility studies on selected rivers in the country such as South Rukuru and Bua with a view to diversifying from the Shire River. There are potential investors who are ready to start producing electricity from solar and coal. This will however require a conducive environment for private sector participation in the power sector.

2.5 Linkages with existing policies and laws

2.5.1 Vision 2020

In the Vision 2020, GoM committed itself to the following vision:

"By the Year 2020, Malawi, as a God-fearing nation, will be secure, democratically mature, environmentally sustainable, self-reliant with equal opportunities for active participation by all, having social services, vibrant cultural and religious values and a technologically driven middle-income country".

Energy was set to play a major role in attaining the Vision 2020. However success has been limited in part due to limited growth in energy sector.

2.5.2 Malawi Growth and Development Strategy (MGDS) II

In reference to energy, the MGDS II recognises that a well-developed and efficient energy system is vital for socio-economic development. In this respect, increasing generation capacity, improving transmission, distribution and supply of electricity will contribute to an efficient energy system in the economy. Improving the distribution and supply of other energy sources will complement an efficient energy system.

2.5.3 Economic Recovery Plan

One of the priority areas of the Government's Economic Recovery Plan of 2012 is energy. Cognizant of the fact that the country continued to face a number of challenges in the Energy Sector, including inadequate capacity to generate electricity and intermittent power supply, which were affecting economic activity in areas such as mining and manufacturing, Government made the following commitment:

Government will support investments in energy generation and supply in order to generate and distribute sufficient amounts of energy to meet national socio-economic demands. It will endeavour to, among other activities, do the following:

- ***i*** *Continue financing works on the Kapichira II project;*
- ***ii*** *Establish new hydroelectric power stations;*
- ***iii*** *Continue pursuing the Millennium Challenge Compact with a view to widening its scope;*
- ***iv*** *Manage the demand in the industry by encouraging economical usage of electricity, including usage of energy saver bulbs;*
- ***v*** *Encourage regional interconnectivity;*
- ***vi*** *Explore the feasibility of coal-fired generation of electricity;*
- ***vii*** *Enhance research in other sources of energy including wind and solar; and*
- ***viii*** *Promote Public Private Partnerships (PPP) in energy generation and distribution.*

These are very clear policy directions and commitments of the Government with regard to energy, and new policy has taken these into account.

2.5.4 Constitution of the Republic of Malawi

Section 13 of the Constitution embodies principles of national policy that will ensure that the State is actively promoting the welfare and development of Malawians. In particular, it mandates the State to develop policies that will facilitate adequate health care, prevent the degradation of the environment, enhance the quality of rural life, support the furtherance of education, support people with disability in all spheres of life and ensure the full participation of women in all areas on the basis of equality with women. Additionally, Section 30 of the Constitution guarantees the right to development for all Malawians. To effectively realise this right, the State has an obligation to take all necessary measures, including to facilitate equality of opportunity for all in their access to basic resources, education, health services, food, shelter, employment and infrastructure. Improving access

to modern and sustainable sources of energy through the energy policy is one significant measure to meet these constitutional aspirations and guarantees.

Energy is crucial to the advancement of health care and education, especially in rural areas where quality of services is compromised by poor lighting and poor amenities for staff housing (resulting in high staff turnover). Environmental degradation threatens energy supply, especially hydro-electricity and biomass. Rural electrification is a vital element for improving the quality of rural life. Energy, especially biofuels, can affect food security if production strategies are flawed. However, energy can also promote food security if technologies such as biogas are used creatively. Energy programmes and projects are an opportunity to facilitate the development of women and people with disabilities in the energy sector through deliberate medium to long term strategies related to formal employment and entrepreneurship. Most modern infrastructure that is necessary for socio-economic growth needs sustainable forms of energy. All this demonstrates that energy is indispensable to the promotion of welfare and development in Malawi.

2.5.5 Gender Equality Policy and Law

The new energy policy has to work towards addressing barriers that hinder the meaningful participation of women in the sector. The Gender Equality Act No. 3 of 2013 is one statute that directs how sectors should take an active role in promoting gender equality, equal integration, influence, empowerment, dignity and opportunities for men and women in all functions of society. The application of the Act in the energy sector would facilitate the permeation of these standards in organizational structures, governance, internal transactions, dealings with contractors and within the whole supply chain, and in relations with clients or customers etc.

One of the broad objectives of the National Gender Policy (2015) is to strengthen gender mainstreaming in all sectors of the economy in efforts to accelerate economic growth and poverty reduction. Under the priority area of environment, climate change and management, the Department of Energy has the specific responsibility to ensure the integration of gender in environmental impact assessments (EIAs). Of course, gender mainstreaming in energy transcends the area of EIAs, since all sectors should aspire to contribute to the achievement of all the priorities of the National Gender Policy. Another directly relevant priority area to the energy sector is 'gender and economic development' under which there is a call to mainstream gender in national budgets, plans, strategies and programmes.

2.5.6 Trafficking in Persons Act

Infrastructure development is sometimes associated with incidences of human trafficking. This includes instances where a person may be forced, directly and indirectly, to perform a contract; and where women may be trafficked by others to work in project areas as commercial sex workers. The Trafficking in Persons Act No. 3 of 2015 defines trafficking in persons (TIP) as employing, transporting, transferring, keeping, or receiving a child or a person within or outside Malawi with the intention to exploiting him or her. Energy projects have to adopt a zero tolerance policy with regards to TIP, and this includes developing strategies to ensure that the risk of TIP is assessed, mitigated, monitored and addressed.

2.5.7 HIV and AIDS Policy

The National HIV and AIDS Policy (2013) as read with the National Strategic Plan for HIV and AIDS (2015 – 2020) requires the implementation of comprehensive workplace HIV interventions and such interventions that target highly mobile groups. Workers in energy infrastructure development projects would fall under the latter category. Since adolescent girls and new mothers (15-24 years) contribute half of new infections in Malawi, construction projects increase the risk for workers that come from outside project affected communities, just as they increase the risk of women and girls in the communities. Therefore, mainstreaming HIV in the energy sector is necessary for purposes of developing HIV prevention measures to protect women and men according to their specific vulnerabilities; minimizing disruptions to critical health services such as ARVs; and to generally prevent, mitigate and monitor HIV and AIDS risks in energy projects. These measures are consistent with the strategic area of the National HIV and AIDS Policy that pushes for the integration of HIV programmes into policies, workplaces and core businesses of all private and public enterprises. In the workplace, the National HIV and AIDS Workplace Policy expects all institutions, which inevitably includes energy institutions, to adopt non-discriminatory work policies and to implement HIV prevention, treatment and mitigation programmes for the furtherance of the wellbeing of affected and infected people and the sector as a whole.

2.5.8 Environment Management Act and Policy

The Environmental Management Act was enacted to operationalise the Environment Management Policy. It makes provision for the protection and management of the environment and the conservation and sustainable utilization of natural resources. The Act defines environment as the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odour, taste, and the biological factors of fauna and flora, and includes the cultural, social and economic aspects of human activity, the natural and the built environment.

Part VIII of the Environment Management Act provides for pollution control. Section 42 thereof prohibits the discharge or emission of any pollutant into the environment in any other manner except in accordance with the Act. Section 43 requires that the discharge of effluent or gaseous substances must only be done by duly licensed individuals and not otherwise. Finally, section 44 under this Part states:

"The Policy and the Act further require that any prescribed project must not be undertaken without an environmental impact assessment report being approved first."

Most projects in the energy sector are prescribed projects and require environmental impact assessment. Hence energy projects must adhere to the Environment Policy and Act. In addition some energy operations such as coal, nuclear, biomass, liquid fuels produce waste that can damage the environment including polluting the ground and the air. These energy operations should ensure they don't cause damage to the environment.

2.5.9 Mining and Minerals Policy and Act

The goal of the Mines and Minerals Policy is to enhance the contribution of mineral resources to the economy of the country so as to move from being agro-based to mineral based economy. This policy has committed to setting up a legal and regulatory regime to

guide investors and other stakeholders in the mining and mineral exploration sector. The policy advocates for the development of adequate infrastructure to support the development of mining in Malawi. It is therefore important that in order to ensure rapid development of the mining sector, there must be sufficient energy in the country.

Coal, when it is being mined is a mining concern, but after being extracted it is an energy source. Sometimes the dividing line between the two is very thin and blurred. Therefore there is need to streamline the regulatory regimes of mining and energy to avoid overlaps or contradictions. It is noted that under Section 42 of the Mines and Minerals Act that a licence for mining gives the licensee authority to extract the mineral and dispose of any waste emanating from its processing and usage, among other rights. One of those minerals is coal. Yet under the Energy Regulation Act, coal as an energy source is regulated in terms of storage, transportation, waste disposal etc.

2.5.10 Forestry Act and Policy

The Forestry Act was enacted to provide for participatory forestry, forest management, forestry research, forestry education, forest industries, protection and rehabilitation of environmentally fragile areas and international co-operation in forestry and for matters incidental thereto or connected therewith.

The Act also prohibits harvesting of trees except under a licence issued under the Act.

In the context of energy, biomass is the downstream products of forests. Hence biomass use must comply with the Forest Policy and Forest Act. These instruments have been taken into account in this Energy Policy. In this regard there is need to streamline energy and forestry regulatory regimes. For example the ideal situation would be that licensing for the cutting down of trees should be a Forestry Department matter but licensing for production of charcoal should be an energy regulation matter under MERA. However because of the intricate connection between trees and charcoal, it is convenient that cutting trees for charcoal making must be linked to the charcoal making in one licence issued by the Forestry Regulator. The law or regulations for Forestry must be enhanced to ensure it adequately covers the licensing of tree cutting and charcoal making under a prescribed criteria. However, biomass intended for use in producing electricity or producing biogas should be licensed by the Energy Regulator, MERA.

2.5.11 Water Policy and Water Resources Act

The purpose of the Water Resources Act is to provide for control, conservation, apportionment and use of water resources. It is primarily concerned with regulating the abstraction of water nationally. Most energy projects use water either for generation of electricity or for discharge into the water waste from electricity generation activities. Hence energy projects must comply with the Water Policy and the Water resources Act.

Section 16 of the Act in part says:

"(1) Any person who, save under the authority of this Act or any other written law, interferes with or alters the flow of or pollutes or fouls any public water, shall be guilty of an offence."

The Policy and the Act also prohibits abstraction of water without a licence given by the Water Resources Board. The Water Resources Act provides for permits for those intending to abstract water. There are elaborate provisions for applications for water right including detailed criteria on the grant or refusal of the said application. One of the criteria for grant is to see whether or not the proposed abstraction and use of water are consistent with the objectives of the Act and National Water Policy as well as National Water resources Master Plan and any reservation of water made under section 7 of the Act. The Authority would also want to see the impact of the proposed abstraction on existing water users as well as the environment and also the conformity of the proposed use with the efficient use of water management and other issues of concern.

In the context of energy the main concern is with respect to water abstraction licence for hydro generation purpose. A hydro generation licensee needs to apply for a water licence to be able to divert water for electricity generation. Further some energy operations such as coal, liquid fuels, produce waste which could contaminate water. Such energy operations must make sure that water resources are not contaminated.

3. BROAD ENERGY POLICY OUTCOMES, GOAL AND OBJECTIVES

3.1 Policy Outcomes

The following are the intended outcomes for the energy policy:

1. **An energy sector that is based on diversified energy sources;**
2. **A well developed and efficiently managed energy sector;**
3. **An Energy sector that promotes and supplies modern and sustainable energy services for driving the country's economic growth;**
4. **An Energy sector that promotes and result in a high standard of living for all men and women in Malawi; and**
5. **Access to clean and sustainable energy for all people.**

3.2 Policy Goal

The goal of the policy is "Access to affordable, reliable, sustainable, efficient and modern energy for all Malawians by 2030."

3.3 Policy Objectives

1. **To strengthen the Electricity Supply Industry and make it more efficient and capable of providing an adequate, affordable and reliable electricity supply which will enable industrialization, rural transformation, sustainable economic development and wealth creation, as well as regional electricity trading.**
2. **To ensure the country has adequate production, supplies and stocks of petroleum fuels at all times, complemented with biofuels at affordable prices**
3. **To ensure availability of LPG, biogas and natural gas in sufficient quantities at affordable prices for industrial and domestic purposes and enable households and institutions move away from biomass to LPG, biogas and natural gas as fuel for cooking and other purposes.**
4. **To promote a coal supply industry that has broad private sector participation and that competes favourably with those in neighbouring countries but using technologies that eliminate or greatly reduce harmful emissions.**
5. **To ensure biomass is sustainably used and carbon emissions are reduced through the use of energy efficient technologies.**
6. **To ensure the establishment of a vibrant, reliable, incentivized and sustainable private sector driven Renewable Energy Technology industry.**
7. To promote energy programming, budgeting and monitoring that routinely addresses all aspects of social, gender and economic development in energy programmes and services.

4. ENERGY SOURCE CATEGORIZATION AND ENERGY MIX PROJECTIONS

4.1 Background:

The energy mix as it exists today consists predominantly (89%) of biomass as the main source of energy. Hence to establish a basis for determining the probable energy mix with other fuel sources gaining prominence, the approach followed is that of replacement of the traditional fuels by other commercial sources of energy. This scenario is likely and provides a broad estimate of reduction in biomass usage through increased electrification and/or development of renewable energy sources.

The emphasis is made only towards biomass as it still is a predominant energy source, replacement/reduction of which is pertinent for Malawi's roadmap towards economic growth.

For the demand side energy requirement for 2030 there is reliance on the demand projections as per Malawi Energy Demand Assessment Report, Jan 2011 (IAEA) as a reference document.

4.2 Categorization of Energy Sources

The energy mix has the following categories:

1. Electricity from Non-Renewable Sources
2. Electricity from Renewable Sources
3. Biomass
4. Petroleum Fuels
5. Biofuels
6. Liquefied Petroleum Gas (LPG), Biogas and Natural Gas (NG)
7. Coal.
8. Electricity from Nuclear Energy

4.3 Electricity from Non-renewable Sources

The Energy Regulation Act defines Non-renewable Energy as follows:

"Non-renewable Energy" means those sources of energy available to mankind arising from natural processes in the interaction between the sun and the earth's surface but not regularly replenished and these include uranium and fossil fuels e.g. coal, peat, crude oil and natural gas.

While nuclear energy is non-renewable, electricity from nuclear power plants is treated as a separate category in this policy, since the technology is not yet in use in Malawi and calls for separate strategies from those for the other non-renewable energy sources.

The renewable sources of electrical energy considered in this policy are Hydro, Solar Photo-Voltaic (PV), Wind, Hybrid Solar-Wind, Biomass Cogeneration, and Geothermal Heat. While renewable energy applications include non-electricity generating ones like solar thermal

water heating and water pumping using windmills, the contribution of these to the energy mix is considered insignificant and has therefore not been taken into account in the projections.

4.4 Coal as a Stand-alone Category

The category Coal relates to coal used for purposes other than electricity generation, i.e. industrial processes and domestic applications. Including all energy from coal in this category would mask the fact that substantial quantities of coal will be used for generation of electricity, and accounting for this energy in the coal proportion of the mix would be tantamount to double accounting, which would distort the mix. The proportions of coal presented in ***Table 1*** therefore relate to coal used in processes other than electricity generation, which should explain the relatively small quantities.

4.5 Challenges in Data Presentation

Challenges encountered in presenting data in the new categories were twofold:

i. There was insufficient data in some of the categories, such as **Petroleum Fuels** and **Liquefied Petroleum Gas, Natural Gas and Biogas**

ii. In other categories, the data had previously been presented in different combinations and it required disaggregation. Examples of this are Ethanol and LPG, which were previously lumped together as the **Liquid Fuels and Gas Supply Industry**.

Apart from the fact that some historical data was available for only very few data points, in some cases it was not starting from the base year. Instead, data that was available was starting in later years than the base year for the projections. The projections had in such cases to be done in the forward direction as well as the backward direction to the base year. In order to address this problem going forward, there is need for accurate records to be kept according to the categories of energy as presented in this new energy policy.

A combination of techniques was used to overcome the data scarcity problem. These included consultations with policy level experts on indicative government direction along the different energy source paths. The information provided and the available data starting points provided a basis for deriving trends for the projections.

4.6 Changing Trends in Available Data

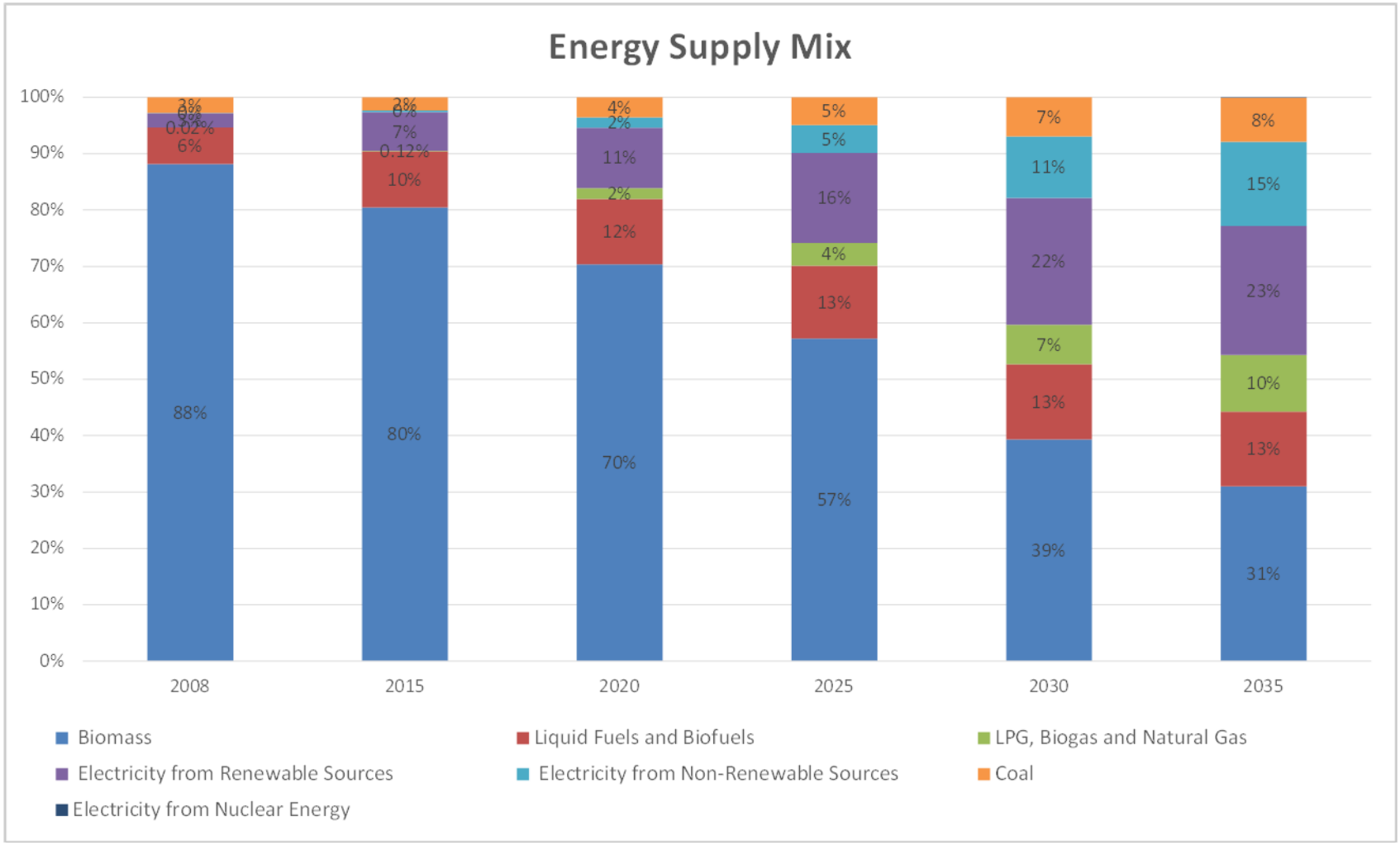
In a few cases the available data showed patterns where figures would increase in one period and decrease in other years as opposed to a consistent one way trend. The general assumption made was that these were short term oscillations on a long term movement with a discernible trend in one direction or the other. The magnitude of the changes over a cycle was considered and the mean change was used in the projection, but the short term oscillations were not repeated.

The historical, current and projected energy mixes, based on the new categorization, are presented in the table and the graph below. While arriving at the fuel type wise supply mix, no restriction has been considered on the potential of the particular resource in the country.

Table 1: Demand and Supply - Historical and Projected to 2035

Sector		**2008**	**2015**	**2020**	**2025**	**2030**	**2035**
Industry	kTOE	345	457	683	1,052	1,709	2,184
Transportation	kTOE	215	396	526	736	1,025	1,292
Household	kTOE	3,446	3,567	3,643	3,759	3,796	3,850
Service	kTOE	129	91	146	210	342	431
Total Supply		**4,136**	**4,512**	**4,997**	**5,757**	**6,872**	**7,757**
Energy Supply Mix as per our approach	Units						
Energy Source		**2008**	**2015**	**2020**	**2025**	**2030**	**2035**
Liquid Fuels and Biofuels	%	6%	10%	12%	13%	13%	13%
LPG, Biogas and Natural Gas	%	0.02%	0.12%	2%	4%	7%	10%
Electricity from Renewable Sources	%	3%	7%	11%	16%	22%	23%
Electricity from Non-Renewable Sources	%	0%	0%	2%	5%	11%	15%
Coal	%	3%	2%	4%	5%	7%	8%
Electricity from Nuclear Energy	%	0%	0%	0%	0%	0%	0.1%
Biomass	%	88%	80%	70%	57%	39%	31%
Total		**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Graph 1: Energy Source Mixes: Historical, Current and Projected to 2035



5. POLICY PRIORITY AREA: ELECTRICITY

5.1 Priority Area: Electricity Generation

5.1.1 Background

Electricity generation in Malawi is characterised by inadequate generation capacity. Nearly 95% of Malawi's electricity supply is provided by hydropower from a cascaded group of interconnected hydroelectric power plants located on the middle part of Shire River and a mini hydropower station on the Wovwe River, which constitute the interconnected system. Total installed capacity of these hydropower plants is 349.85MW. The standby diesel generator at Mzuzu is rated at 1.10MW, while Likoma District has two separate isolated systems with a total installed diesel-fuelled power plant capacity of 1.05MW. ESCOM's total installed capacity, inclusive of the thermal plants, is therefore currently about 352.00 MW.

With only 352 MW of installed generation capacity against an estimated demand of over 700MW at present, there is a gap that needs to be met urgently if the goal of sustainable energy for all is to be met. ESCOM, which is a vertically integrated utility, owns all the generating stations. There are no IPPs in the generation industry that can assist to fill this gap mainly due to the unfavourable legal framework that acts as a barrier to entry of IPPs into the industry. With revised legislation that will attract more private players to the industry, IPP and PPP generation projects offer the quickest way to augment ESCOM's efforts towards meeting the current and future demands.

Electricity generation is also characterised by overdependence on the Shire River as the main source of electricity as shown above. Overdependence on hydropower poses the serious risk of catastrophic reduction or even loss of energy in times of drought. The country's overdependence on one river can also be catastrophic. There is need for diversification of hydro energy resources instead of overdependence of one river.

Therefore there is need to develop other energy sources especially renewable sources such as geothermal, wind, nuclear and solar.

Malawi's electricity grid is currently not interconnected with those of neighbouring countries, and Malawi is thus not able to either take advantage of importation of power from Mozambique, Zambia or Tanzania under SAPP or EAPP trading arrangements or to supply power to these countries when excess capacity is available.

5.1.2 Policy Statements

1. **GoM shall diversify power generation sources for security of supply and expand generation capacity to meet the demand for electricity in the country**
2. **GoM shall review the legislation to ensure expedient implementation of the Power Market Restructuring, which will result in the separation of ESCOM generation from ESCOM transmission and distribution**
3. **GoM shall interconnect its power system with the SAPP and the EAPP grids.**

5.2 Priority Area: Electricity Transmission

5.2.1 Background

As at 2016 there was one national utility owning, operating and maintaining the national electricity transmission grid, comprising power transmission lines and grid substations operated at two voltage levels, namely 66kV and 132kV. The transmission power lines are on either wood or steel structures. The System Operations Department, which runs the National Control Centre is one of the departments of the National Utility's Transmission Division.

This power system is isolated from those of the neighbouring countries, except for cross-border supplies (through the distribution system) to small border towns in Mozambique and Zambia.

There are some capacity constraints in this power transmission system. Transmission line overloads have for some time now been evident in the system, especially in the Northern Region, where highest voltage in use is currently 66kV, with a weak 33kV link between Telegraph Hill and Bwengu Substations that is used as both a primary distribution and a low capacity sub-transmission line. Some transmission lines in the Southern and Central Regions are also heavily loaded and cannot transfer the additional capacity available from the new power stations and the imminent interconnections with Mozambique and Zambia.

The increased transmission system capacity is also crucial for evacuation of power from the generation stations, whether operated by National generation stations, IPPs or PPPs. The coming in of IPPs will also require that there should be a robust regulatory regime to ensure open access to the transmission system in a non-discriminatory manner. Hence the unbundling of the National utility Generation from Transmission and Distribution is the necessary condition for ensuring this open and non-discriminatory access to the transmission system so that all generation plants should have access thereto in a properly regulated manner under a robust Grid Code.

Since transmission projects can disturb the way of life of local communities, especially through rights of way (ROWs), social and gender considerations come into play. First, feasibility studies and/or environmental and social assessments have to generate thorough data on how subgroups of men and women in project affected communities are likely to be positively or negatively impacted by the transmission project. This means that the involvement of experienced social experts in feasibility and ESIA teams should be a prerequisite.

5.2.2 Policy Statements

1. **GoM shall intensify the expansion and rehabilitation of the transmission system that will catalyse industrialisation, rural transformation, sustainable economic development, inclusive growth and creation of wealth.**
2. **GoM shall put in place robust market operation rules and enforce the Grid Code.**

5.3 Priority Area: Distribution

5.3.1 Background

The country's primary distribution system is operated at 33kV and 11kV, and these voltages are stepped down using distribution transformers to 400/230Volts for secondary distribution.

As at 2016 the country's national utility supplies electricity to over 250,000 customers categorized as domestic, general, commercial and industrial. For domestic customers, sex disaggregated data is unavailable, despite the fact that this information is useful both for improving access to electricity 'to all' and the 'bottom line.' The current number of customers translates into 9.0 percent of the national population having access to electricity. The Distribution Directorate is also responsible for the operation and maintenance of all the medium and low voltage lines, transformers and associated switchgear.

GoM had under the 2003 energy policy intended that the ESI would provide an adequate, affordable and reliable power supply which would assist in industrialisation, rural transformation, sustainable economic development and reducing poverty. It was hoped to increase the number of people with access to electricity from 4% to 10% of the population by 2010, 30% by 2020, and 40% by 2050. This has not been achieved.

The Integrated Household Survey of 2012 showed that by 2010/2011 about 8% of households were using electricity for lighting and only 2.5% were using electricity for cooking. This therefore means access to electricity still remains a major challenge in Malawi, which calls for urgent attention. One barrier to utilization of electricity for cooking by electrified low-income households is the high cost of electrical appliances. Although many cooking appliances sourced within the SADC have been exempted from taxes, those from South Africa are not tax-exempted, and VAT is still applicable to all appliances.

Another barrier is the high cost of connection to the grid including the cost of transformers. Further as at 2015 ESCOM had a considerable number of applications for connection of power supply, but it was unable to do the connections for various reasons including material procurement bottlenecks and limited capacity to construct the lines to customers. The former should be addressed by allowing customers to procure transformers and other requisite materials to the power utility's specifications. The utility company will then take over the assets and compensate the customers for the same. The issue of limited capacity to construct lines is already being addressed through contracting these works out. High service connection costs, as well as tariffs that are unaffordable to poor households, are extra barriers that need to addressed.

5.3.2 Definition and Measurement of Access to Electricity

The method hitherto used for defining and measuring electricity access resolved around a grid connection – one either had a grid connection or did not. In view of the fact that off-grid technologies such as PSPs and isolated mini-grids provide fundamental electricity services to users, the Sustainable Energy for All (SE4All)[3] initiative developed the Global Tracking

[3] SE4All is an initiative of the UN Secretary General, one of the main objectives of which is to achieve Universal Access to Energy by 2030. The Malawi Government is a signatory to SE4All.

Framework (GTF)[4] as an improved method of defining and measuring energy access (www.se4all.org). See Table 2 below.

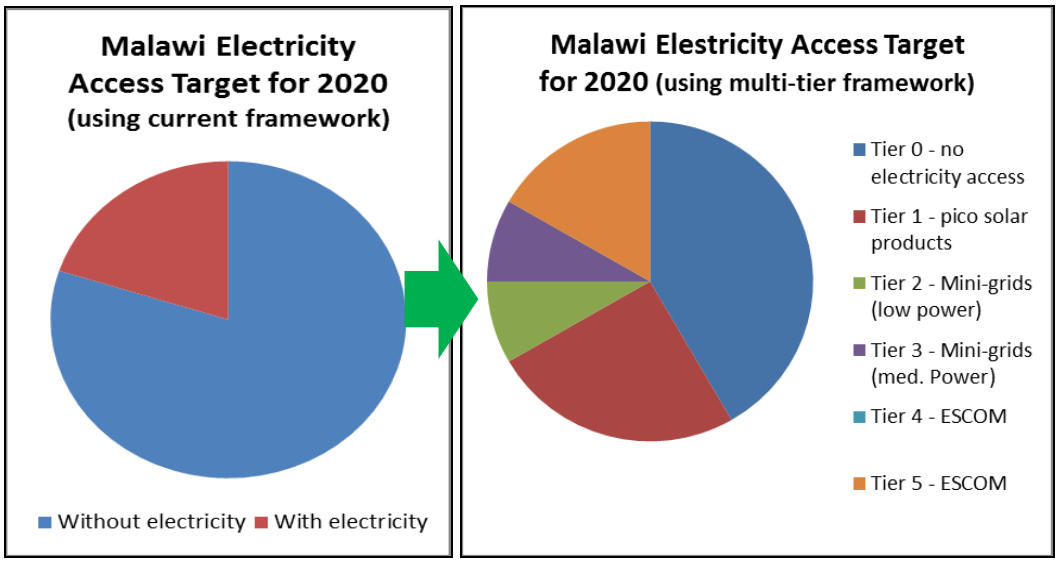
Table 2: SE4All framework for defining and measuring access to electricity

			Tier-0	Tier-1	Tier-2	Tier-3	Tier-4	Tier-5
Attributes	1. Peak capacity	Power	No Electricity	V. Low Power Min 1 W	Low Power Min 50 W	Medium Power Min 200 W	High Power Min 2 kW	
		Daily capacity		Min 4 Wh	Min 200 Wh	Min 1.6 KWh	Min 4 KWh	
	2. Duration	Hours per day	< 4 hrs	Min 4 hrs		Min 8 hrs	Min 16 hrs	Min 23 hrs
		Hours per evening	< 2 hrs	Min 2 hrs		Min 2 hrs	Min 4 hrs	Min 4 hrs
	3. Reliability					Max 3 disruptions **per day**	Max 7 disruptions per week	Max 3 disruptions **per week** of total duration < 2 hours
	4. Quality					Voltage problems do not prevent the use of desired appliances		
	5. Affordability				Cost of a standard consumption package of 365 kWh per annum is less than 10% of household income			
	6. Legality					Bill is paid to the utility / pre-paid card seller / authorized representative		
	7. Health and Safety					Absence of past accidents and perception of high risk in the future		

Adopting a multi-tier framework for measuring energy access is an easy win for the Government of Malawi; it will show an immediate 2% increase of people with electricity access. It would also enable measurement towards a target, and facilitate the efficacy of government support to the industry. Assessing individuals' access to PSPs could be done through importers data or future national surveys (such as DHS). Government is adopting this Global Tracking Framework for measuring access to energy in Malawi.

Charts 2a and 2b: A multi-tier framework presents a more accurate picture of the improved electricity access situation of a country.

[4] The Global Tracking Framework is available at: http://www.se4all.org/tracking-progress/accountability-framework/ SE4All offer guidance and support in adopting the framework.



5.3.2 Policy Statements

1. **GoM shall intensify the expansion and rehabilitation of the distribution network**
2. **GoM shall incentivise distribution licensees to devise schemes that will enable consumers connect electricity to their homes, and afford basic electrical appliances.**
3. **GoM shall encourage distribution licensees to expedite connections to customers' premises.**
4. **GoM shall adopt the Global Tracking Framework (GTF) for defining and measuring access to electricity.**

5.4 Priority Area: Rural Electrification

5.4.1 Background

The Rural Electrification Fund has had some impact on electrification of rural areas but this has not been as big as it should have been. The transparency and accountability in the management of these funds needs to be enhanced and aligned with regional best practice in

order to attract donors, the private sector and others to participate in and contribute to this fund in order to accelerate rural electrification and increase access to electricity.

Rural Electrification has also up to now targeted mainly grid extensions. Renewable energy and mini grids have not been promoted significantly. Further, rural electrification has so far concentrated on electrifying selected trading or rural growth centres in the districts. Villages, especially households, grain mills, and social services facilities need to be reached in order to increase access to electricity as over 80% of the population of Malawi live in rural areas. This will dramatically improve the quality of life in rural areas, and avert consequences of energy poverty on rural women such as risks of violence and drudgery. Transformers and associated infrastructure for electricity connection are very expensive. If the Rural Electrification Fund can pay for these it will accelerate access to electricity.

Rural electrification can be more inclusive by expanding the grid network and promoting renewable energy including mini grids. Generally, rural electrification can improve its benefits to subgroups of rural men and women through deliberate action to incorporate relevant social and gender considerations in planning, governance, management, recruitment, procurement, and operations.

It is also noted that many rural public institutions are not connected to electricity from the national grid, mini grids, or other renewable sources including solar installations. Most of the SDGs the UN has just put in place cannot be met without access to adequate and reliable electricity supplies in rural areas.

5.4.2 Policy Statements

1. **GoM shall restructure Rural Electrification and Renewable Energy management governance.**
2. **GoM shall, through the Rural Electrification Fund, pay for the cost of a transformer and associated infrastructure where it is intended to serve a minimum prescribed number of customers.**
3. **GoM shall intensify electrification of rural growth or trading centres as well as rural settlements and villages.**
4. **GoM shall facilitate wiring of public institutional buildings in rural areas and connection of electricity thereto.**

5.5 Priority Area: Renewable Energy

5.5.1 Background

Renewable energy means those sources of energy available to mankind arising from natural processes in the interaction between the sun and the earth's surface and regularly replenished and these include the sun as the primary renewable energy resource and the secondary renewable energy resources that derive from the sun as well as wind energy,

hydro, ocean thermal, ocean wave, ocean tidal and electricity from photo-voltaic effects, biomass, geothermal, etc.

Ordinarily when renewable energy sources are used to produce electricity, the electricity has to be regulated in the same way as that from non-renewable sources. One of the regulatory instruments for regulating electricity from renewable energy sources is the Feed-in Tariff policy which MERA has formulated.

Some of the barriers to exploitation of renewable energy sources are:

i Inadequate human capacity building at all levels in RET products, services, installation and maintenance, and marketing;

ii Lack of information to or awareness by the population;

iii Prohibitive capital costs of RET products, e.g. mini grid systems, solar PV systems and PSPs; and

iv Lack of enforcement mechanisms for standards resulting in a proliferation of poor quality products, e.g. PSPs, on the market

There are a number of small solar photo-voltaic installations at some government institutions like hospitals, as well as some solar home systems. The largest Solar PV installation in Malawi is currently the 850kW solar farm at Kamuzu International Airport in Lilongwe. However some of the Solar PV systems installed under the Rural Electrification Programme have run into problems and are no longer functional for various reasons, including lack of maintenance.

Pico Solar Products (PSP) are products that use solar power charged batteries to provide lighting and power for mobile phone charging and in some cases powering radios. An estimated 100,000 PSP units have been sold in Malawi in the period 2012-15 (BIF, 2014). These products provide electric lighting for approximately 500,000 people, which is equivalent to 40% of ESCOM's customer base, currently estimated at 1.2 million people (Demographic and Health Survey, NSO). Wide use of these products would support:

i Improved health and safety;

ii Improved education;

iii Improved maternal health services and

iv Improved access to communication.

According to UNESCO, in 2012 only 10% of primary schools and 52% of lower secondary schools in Malawi had access to electricity. Although there are no current statistics, electricity access rates for rural health facilities is thought to be equally low.

Social and gender considerations have to be at the centre of all RE interventions if access to modern renewable energy sources is to be equally facilitated for both men and women of diverse socio-economic backgrounds; and if women and men are to be equal players in RE industry. Women are currently lagging behind in RE related entrepreneurship, technical expertise and employment, amongst others.

5.5.2 Policy Statements

1. **GoM shall strengthen the exploitation of Renewable Energy Resources.**
2. **GoM shall promote Renewable Energy Technologies.**
3. **GoM shall support small scale renewable energy initiatives by communities or entrepreneurs.**
4. **GoM shall promote capacity building, taking into account all gender issues in all areas of RET programming, supply and services, as well as in entrepreneurship and management**

6. POLICY PRIORITY AREA: BIOMASS

6.1 Background

Biomass is organic matter that can be used to provide heat, make fuel and generate electricity. Wood-fuel, the largest source of biomass has been used to provide heat for thousands of years. Many other types of biomass, such as plant residue from agriculture or forestry and the organic component of municipal and industrial waste, are also used as energy sources. Landfill gas is also a product of biomass.

It is estimated that over 3 billion people globally and 700 million people in Africa rely on biomass fuel as their main source of domestic energy. Indoor air pollution from biomass fuel is increasingly recognised as a major health concern in the developing world; it ranks tenth among preventable risk factors contributing to the global burden of disease, and is responsible for an estimated 36% of mortality due to respiratory disease. (Research paper on Wood Smoke Exposure, Poverty and Impaired Lung Function in Malawian Adults by Liverpool Welcome Trust and others, 2010).

However improved cook stove technologies have been developed and are being developed or improved with a view to: reducing wood usage (which also saves time and workload for women and girls); reducing diseases associated with smoke such as respiratory infections; reducing carbon emissions (thus reducing exposure to smoke and resultant health impacts); promoting other aspects of health through reducing the risk of snake and insect bites, severe fatigue, backache, and miscarriages; improving safety (there is no excessive heat and women's/girls' risk of rape or attacks during firewood hunting is minimised); and generally reducing environmental pollution.

The negative health issues associated with wood fuel for cooking are also applicable to charcoal, though it should be noted that charcoal usually emits less particulate matter but more toxic carbon monoxide than un-carbonised wood. According to the Global Burden of Diseases, Injuries, and Risk Factors Study of 2010, the leading health risk factor in Malawi is household air pollution from solid fuels which leads to respiratory infections, cancer, and other health problems.

Burning of bricks for house making is also another cause of high biomass consumption. There are technologies now for reduction of biomass required for brick burning, which need to be promoted. There are also new improved technologies for charcoal making, which use less wood than the traditional charcoal making methods.

What the above shows is that with improved technologies, households and charcoal makers will be able to use less wood than that consumed by the less efficient technologies. It also shows that use of improved technologies will reduce carbon emissions and reduce incidents of diseases associated with use of fire wood and charcoal. Thus a combination of use of improved technologies, wide use of LPG, biogas and natural gas for cooking and rural electrification as well as renewable PSPs can significantly reduce the amount of biomass consumed, which will result in saving forests and reduce harmful emissions and incidents of respiratory diseases.

6.2 Policy Statements

1. GoM shall build strong partnerships with the private sector and NGOs

(including PPPs) to promote the manufacture, distribution, use and financing of improved cook stoves, brick kilns, charcoal kilns and biomass briquettes.

2. **GoM shall intensify training and nationwide promotional activities for improved cook stoves, brick kilns, charcoal kilns, and biomass briquettes**

3. **GoM shall promote the certification and labelling of all energy efficient commercial cook stoves that are sold as commercial products on the market**

4. **GoM shall encourage charcoal making communities to venture into alternative income generating activities**

7. POLICY PRIORITY AREA: PETROLEUM FUELS

7.1 Background

Petroleum-based fuels are fossil fuels which include gasoline (petrol), diesel, kerosene, heavy fuel oil (HFO) and paraffin. The Government of Malawi's short to medium term policy goal is to continue with its reforms in the Petroleum Fuels downstream market by restructuring the market through encouraging greater private sector participation and the localization of retail petroleum fuel outlets.

The Government has approved reforms where it will engage in a bulk procurement system in the importation of fuel into the country. The private sector is being encouraged to participate actively in the downstream activities of the fuels market. . Government has also established inland dry ports to hold fuels to last 60 days. All licensees are enjoined to hold at least 30 days of fuel holdings not just in tankers but in storage facilities, giving a national total of 90 days' supply. If necessary, the inland ports that have been established can be used to host fuel for Oil Marketing Companies at a fee. These should therefore be regarded as common user facilities. At present, some Oil Marketing Companies keep fuels in tankers as they do not have sufficient storage facilities. This is not efficient as it grounds those tankers instead of letting them go and haul more fuel.

The 2003 Policy stated that in order to expedite the implementation of the Government's retail outlet localization policy, own operation of retail outlets by any Oil Marketing Company (hereafter referred to as OMC) had to be restricted to a maximum of two filling stations.

As of end May 2015, Malawi had 170 fuel retail outlets[5]. Out of these, there were 62 Total retail outlets, 55 PUMA retail outlets, 25 Petroda retail outlets, 17 Engen retail outlets, 6 Injena retail outlets and 5 Energem retail outlets. According to the available information, some OMCs have completely franchised all their retail outlets while one or two still operate their own retail outlets[6]. Some of the franchises by OMCs do not seem to be full franchises.

MERA is planning to standardise the franchising system in order to avoid distortions. Naturally some of the OMCs are not in favour of this policy direction. Their argument is based on the fact that different OMCs have different business models. The OMCs for example are arguing that they have franchised outlets using a method that suits their business model which is geared towards promoting uniform international standards and best practices as guided by their head office. While this may be understood, it is important to state that as a sovereign state Malawi is free to make its national policies and promulgate laws to suit the people of Malawi. It is therefore expected that OMCs will operate within the dictates of the country's policies and laws.

Paraffin is a petroleum fuel that has for some time been used for cooking and lighting. Its combustion does, however, release fumes that are hazardous. In order to contribute to a shift

[5] Based on information provided by the Malawi Energy Regulatory Authority (MERA)

[6] Information gathered from MERA and Retail Outlet Operators indicates that PUMA Energy, Injena, Engen, Energem have completely franchised the retail outlets while Total runs some retail outlets under the Young Dealers scheme and Petroda does not seem to have franchised any of its retail outlets fully.

away from biomass for cooking, households shall be encouraged to use paraffin for cooking, but using only modern and efficient paraffin cook stoves.

7.2 Policy Statements

1. **GoM shall ensure the country has adequate petroleum fuels, including paraffin, at all times to meet the demand of the country.**
2. **GoM shall promote the participation of the private sector in the oil market.**
3. **GoM shall maintain and improve the automatic fuel price adjustment system**

8. POLICY PRIORITY AREA: BIOFUELS

8.1 Background

Another important source of fuel is biofuels, in the form of bioethanol and biodiesel. It is noted that the price of bioethanol is marginally lower than that of petrol or diesel, yet bioethanol is less efficient than petrol or diesel. Perhaps the only reason it is being promoted is because it is a renewable energy source. The other problem is reliability of supply of bio ethanol because of the current limited production capacity. It is noted that there is no reserve infrastructure and supply is straight into the tanks at pump stations. There are also no dedicated tanks at the pump stations for bioethanol.

The Malawi Ethanol Programme 2013, spearheaded by the National Commission for Science and Technology, undertook to **"increase bioethanol production and its use as fuel from the current 18 million litres per annum to 49 million litres and 104 million litres per annum by 2015 and 2020 respectively"**. There is no evidence on the ground to show that Malawi has registered any increases in ethanol production. It is fair therefore to conclude that Malawi has not achieved this policy objective.

Additionally, it is recognised that biofuels that are being produced from food crops such as maize can impact on the availability of food crops (and thus the price of food) within communities. While current programmes may not be using food crops for bioethanol or biodiesel production, it is still important for the energy policy to take into consideration this risk considering the likelihood that the biofuels market could grow over the next 20 years. Current biodiesel production is using mainly jatropha plants and production capacity is very small.

8.2 Policy Statements

1. **GoM shall support, encourage and promote the production of bioethanol and biodiesel for blending or stand-alone use in vehicles**
2. **In addition to continuing with the current 80:20 petrol: bioethanol blend ratio, GoM shall promote the use of flex vehicles capable of running on 100% bioethanol and any other blending ratio**

9. PRIORITY AREA: LIQUEFIED PETROLEUM GAS, BIOGAS AND NATURAL GAS

9.1 Background

Liquefied Petroleum Gas or **Liquid Petroleum Gas** (**LPG** or **LP Gas**), also referred to as simply propane or butane, are flammable mixtures of hydrocarbon gases used as fuel in heating appliances, cooking equipment, and vehicles. LPG is prepared by refining petroleum or "wet" natural gas, and is almost entirely derived from fossil fuel sources, being manufactured during the refining of petroleum (crude oil), or extracted from petroleum or natural gas streams as they emerge from the ground. Burning LPG releases carbon dioxide, a greenhouse gas. The reaction also produces some carbon monoxide. LPG does, however, release less CO2 per unit of energy than does coal or petroleum oil.

Natural gas is a fuel made of methane, mixed with up to 20% of other gasses such as ethane and other hydrocarbons. Natural gas is a popular choice for heating and electricity generation needs because of its lesser impact on the environment than that of other fossil fuels such as oil and kerosene. Malawi's neighbouring countries of Mozambique and Tanzania have large deposits of natural gas which they are planning to extract. Malawi can take advantage of this opportunity to tap into the resource if it can build appropriate infrastructure such as transmission pipelines and distribution reticulation.

Biogas is the mixture of gases that is produced through the bacterial metabolism whereby biodegradable materials are broken down in the absence of oxygen. The process produces 60-85% methane, 15-40% carbon dioxide and <1% hydrogen sulphide, which can then be used as a Renewable Natural Gas (RNG) source. The residue of the process is the organic waste that has very rich nutrient qualities and can be used as manure. Biogas can be produced from different sources such as agricultural materials (crop residues, liquid manure and energy crops), animal manure and slaughter waste, vegetable waste, municipal and sewage waste.

Biogas is one way of promoting more efficient and sustainable use of biomass compared to the use of fuel wood which has several negative effects on human health and environment. The gas also reduces the time and burden needed to source the energy for cooking. Other advantages include: improvement of the sanitation, waste recycling, bio-fertilizer production, economical and technical feasibility and the ready availability of materials.

There are, however, several challenges that are hindering the uptake of the technology in Malawi. The first challenge is the lack of awareness and knowledge on the existence of the technology. Secondly people are reluctant to use biogas produced from, for example, animal dung for cooking. The third challenge is the inadequate technical expertise in the field. The technology requires experts for the design and construction of the biogas systems.

In the medium-to-long term, liquid petroleum gas (LPG), biogas and natural gas shall be an important part of the energy mix because women's reliance on process heat for care giving and productive activities means that although they value electricity for lighting, this source of energy (coupled with its high costs) is not the most practical for their cooking/heating needs. LPG and gas (natural gas or biogas) have strong advantages compared to biomass, such as:

i. They provide more practical and viable options for satisfying energy demands for cooking and heating in societies where access to biomass is being suppressed due to depletion of firewood.
ii. They are effective mechanisms for fighting deforestation and soil degradation
iii. They offer a much cleaner environment for the user, while reducing greenhouse emissions.
iv. They are very convenient and user-friendly sources of energy since they can be switched on and off at any time; and
v. They are highly time saving.

There are however several barriers to increased use of LPG, Biogas and Natural Gas in Malawi, one of which is the cost. GoM shall look at ways to do away with barriers to lower pricing and increased uptake of LPG, Biogas and Natural Gas, and identify potential partnerships to promote greater market penetration. There are major opportunities for LPG Biogas and Natural Gas if the market size is increased, as economies of scale will lead to fast reductions of costs. Infrastructure for Natural Gas is also very expensive, hence the need for partnerships with the private sector. PPPs can expedite construction of pipelines and infrastructure for Natural Gas.

The second issue is safety. Without proper safety training and monitoring there would be a lot of fires and accidents. Communities therefore need to be civic educated on safety issues around LPG, Biogas and Natural Gas. Robust training programmes are necessary on the transportation, distribution, storage and use of gas.

The third barrier is lack of a wide distribution network or system for exchanging of cylinders. At present these are concentrated in cities and towns, and they need to be rolled out to rural areas as well. Wide use of LPG, Biogas and Natural Gas would reduce consumption of wood, thereby reducing deforestation and improving the health status of people.

9.2 Policy Statements

1. **GoM shall promote Liquefied Petroleum Gas (LPG), Biogas and Natural Gas as more sustainable and convenient energy options for process heat.**
2. **GoM shall implement programs aimed at building the capacity of the LPG, Biogas and Natural Gas Industry.**

10. POLICY PRIORITY AREA: COAL

10.1 Background

Malawi has 1 billion metric tonnes of probable coal reserves. These resources occur in various parts of the Northern Region (Karonga and Rumphi) and the Southern Region (Lengwe and Mwabvi game reserves in the Lower Shire Valley). Although coal deposits have been known to exist at several locations in Malawi, coal mining only started as recently as 1985.

Five main challenges facing the Coal Supply Industry (CSI):

i. Lack of price competitiveness for Northern Malawian coal compared to imported coal (particularly from Zambia, Zimbabwe and Mozambique).
ii. Lack of competition within the industry (21 years after the liberalisation of 1995, there are still just a few mining companies).
iii. Low productivity and high production costs owing to the use of obsolete technologies.
iv. A general lack of information on firm coal reserves as a result of limited exploration.
v. The absence of an appropriate regulatory framework to govern downstream marketing, transportation and utilisation.

Uncompetitive prices are also partly attributable to the high cost of transporting coal by road from mines located in Northern Malawi to coal-using industries mainly concentrated in Lilongwe and Blantyre, respectively some 500 km and 800 km away. This should be compared with Moatize coal mines which are located only 90 km from Blantyre.

Coal is probably the biggest polluter of the environment and therefore care has to be taken when using it as an energy source. There are well documented societal and environmental burdens of coal that occur through its mining, preparation, transportation, combustion, and waste disposal. Coal naturally contains sulphur, and when it is burned, the sulphur combines with oxygen to form sulphur oxides. Coal-fired power plants are therefore the largest human-caused source of sulphur dioxide, a pollutant gas that contributes to the production of acid rain and causes significant health problems.

The conclusion is that the Regulators need to be vigilant to ensure only minimum pollution or emissions are allowed in the coal supply chain. These regulators include MERA, which regulates coal as energy, the Department of Mines that issues mining licences, the Directorate of Environmental Affairs that is responsible for reducing pollution or carbon emissions, and the Directorate of Sanitation, which deals with waste disposal and issues of health and sanitation. Transportation, storage, distribution and use must also comply with environmental and waste disposal laws and regulations. Modern technologies such as carbon capture are able to reduce the above negative impacts of the use of coal and use of these needs to be enforced and strictly monitored.

10.2 Policy Statements

1. **GoM shall promote and encourage the private sector to take a leading role in the coal industry subject only to regulatory and licensing requirements.**
2. **GoM shall ensure that the responsible regulatory institutions regulate the storage, transportation, importation, marketing, usage, and pricing of coal.**

11. PRIORITY AREA: NUCLEAR ENERGY

11.1 Background

The 2003 NEP stated that Malawi had proven reserves of about 63,000 tonnes of Uranium at Kayelekera in Karonga District in the northern part of the country. Another deposit had also been identified at Ilomba in neighbouring Chitipa District. Being limited in economic strength and wary of environmental consequences of nuclear development, GoM had no plans, in the short-to-medium term, for generating electricity from nuclear energy. Although an open pit Uranium mine was established at Kayelekera by Paladin Energy Limited, and production commenced in 2009, all the Uranium from the mine was exported out of the country for further processing. Power supply to the mine site was from diesel fuelled generators, since the available utility power grid did not have the capacity to provide the requisite 10MW of power.

Due to the sustained low uranium price on the World market, Paladin announced in February 2014 that processing would cease at Kayelekera and that the site would be placed on care and maintenance. This was done in May 2014. It is expected that production will recommence once the uranium price provides a sufficient incentive (circa US$75/lb) and grid power supply is available on site to replace the existing diesel generators with low cost hydroelectricity.

Seven years down the line from 2009, the situation regarding Malawi's capacity to develop and operate a nuclear plant remains pretty much the same, i.e. the country is not ready for this technology. However, Government has made a decision to harness the locally available nuclear energy for electricity generation. To this end, GoM will formulate a capacity building programme in consultation with the International Atomic Energy Agency. The intention is to build adequate capacity to have the first nuclear power plant running by 2035.

11.2 Policy Statement

1. GoM shall build capacity in generation of electricity from nuclear energy

12. PRIORITY AREA: DEMAND SIDE MANAGEMENT

12.1 Background

Demand Side Management (DSM), is an important means of improving energy efficiency at the end-use level of the energy supply chain. Currently in Malawi, there is a lot of wastage of electrical energy and biomass in end-use activities such as cooking, water and space heating lighting occasioned by use of inefficient appliances and devices. This chapter focuses on savings in electricity and biomass consumption through DSM.

12.2 Demand Side Management in the Electricity Supply Industry

Most electricity supply utilities, including members of the Southern African Power Pool, have implemented DSM in various forms, with a view to minimizing consumption of electrical energy. This also translates into a reduction in demand for electrical energy which is a very effective means of controlling peak demand, especially in capacity constrained systems like the Malawian one in its current state.[1]

12.2.1 Utility Actions in DSM

The utilities' DSM programmes entail a combination of some or all of the following actions:

i. Public information campaigns to raise awareness among consumers;

ii. Energy audits to provide energy efficiency advice to consumers;

iii. Installation of energy efficient measures in households to help consumers reduce their bills, but also to reduce stress on overburdened utility systems;

iv. Provision of financing in the form of rebates below-market loans for Energy Efficiency measures, sometimes with the facility of allowing the consumer to repay the loan as part of their utility bill payment. Tunisia is an example of a country that has such an on-bill financing program.

v. Installation of prepayment meters which, in addition to reducing non-payment problems for utilities, also have the effect of increasing energy-efficiency behaviour by consumers.

vi. Implementation of tariffs that encourage efficient use of electricity, such as

   (a) **Inverted Block Rates**, whereby a low unit price for the first block of electricity use, followed by higher tariffs for additional blocks of usage;

   (b) **Time of Use (TOU) Tariffs**, which typically charge more for energy consumed during peak periods, thereby incentivizing load shifting to off-peak periods; and

   (c) **Dynamic or "Real-time" Pricing**, a tariff structure in which the electricity price continuously fluctuates based on availability and demand.

12.2.2 Customer Actions in DSM

Under DSM, the consumer decides what energy-efficiency actions to take. The utility can encourage the consumer and even provide incentives, but the decision is up to the consumer. Under demand response programs, the consumer can still decide whether to participate, but the utility can control the amount and timing of electricity usage. Participating consumers

typically get very short notice from the utility that it will be exercising the use of these measures at any given moment. The energy-efficient actions include:

i. Entering into Interruptible Contracts, which are agreements between utilities and large energy users in which the latter agree to have their power shut off for a short period (e.g., 1-3 hours) in exchange for a financial incentive, in order to reduce peak demand or relieve strain on an overburdened utility grid.

ii. Acceptance of installation of Load Controllers, which are devices installed by the utility on a customer's equipment (usually an air conditioning unit or a geyser) that can be remotely controlled by the utility to cycle off the equipment for 30-60 minutes during periods of high peak demand. The customer receives an incentive, such as a bill credit, for participating. Utilities in Bangladesh for example are trying this on a pilot basis.

iii. Acceptance of the installation of Load limiters in electric meters to prevent consumers from using more than a predetermined amount of electricity during peak periods. Load limiters can in some cases replace meters and the customers are simply charged a flat monthly fee. Customer participation is in most cases involuntary.

iv. Installation of roof-mounted solar water heaters, which will serve as an alternative source of energy for water heating, thereby reducing the amount of electrical energy used for this purpose.

12.2.3 Government Actions

Government actions to promote DSM include the following:

i. Instituting appliance testing, labelling & standards, which will include minimum energy performance standards (MEPS);

ii. Enforcing building codes on energy-efficiency requirements in the construction of new buildings;

iii. Import tariff reduction/elimination for energy efficient products;

iv. Enforcing Government procurement rules that require procured energy-consuming products such as fluorescent lighting devices, ballasts, air conditioners, fans to meet or exceed minimum energy performance standards;

v. Instituting mandatory energy audits and energy use reductions by large customers.

vi. Training, certification and technical assistance for industries, building owners, bankers, utilities, standards agencies, code-setting organizations, energy auditors such as electrical contractors, performance contractors; and

vii. Provision of post-installation inspections and programme evaluations.

i.

12.2.4 NGO Actions

Non-Governmental Organizations can play a major role in promoting DSM through:

i. Programme design and management to assist government agencies and utilities with the structuring and implementation of Energy Efficiency initiatives; and

ii. Information dissemination and awareness raising;

12.3 Demand Side Management in Biomass End-use

The country is experiencing severe degradation of its forestry resources through inefficient and unsustainable use of fuel wood and charcoal. Continued reliance on firewood and charcoal in the light of forest degradation sabotages development and therefore calls for urgent energy efficient solutions. For biomass to be truly renewable, it must be utilised in a sustainable manner, which entails replanting of trees with focus on the fast growing varieties and, at the end-use level, use of more efficient cook stoves as well as brick and charcoal making kilns.

12.4 Policy Statements

1. **GoM shall promote the use of energy efficient technologies.**
2. **GoM shall encourage electricity utilities to implement Demand Side Management programmes**
3. **GoM shall encourage NGOs to promote Demand Side Management.**

13. IMPEMENTATION ARRANGEMENTS

13.1 Institutional Arrangements

There are various Ministries, Departments and sector policies that have impact on energy policy. It is important to see to it that all these are properly coordinated in order to ensure consistency and smooth implementation of the policies including energy policy. The roles and responsibilities of each sector as it impacts on energy need to be clear so that there are no conflicts or duplications or gaps. Some of these policies are Environment; Forestry; Minerals and Mining; Water, Sanitation and Hygiene; Land and Agriculture. Some of these are highlighted in the implementation plan below. In this subsection, we list below some of the key ministries, departments and institutions and their roles and responsibilities in the implementation of this policy. These are as follows:

- Department of Energy Affairs
- Department of Forestry;
- Department of Mining;
- Department of Environmental Affairs;
- Ministry of Natural Resources, Energy and Mining; and
- Single Buyer Transmission and Distribution Company.

13.1.1 Department of Energy Affairs

a) Provide overall leadership in matters of downstream energy activities b) Oversee the reforms in the energy sector and ensure these reforms are executed efficiently c) Ensure legislation is enacted for the unbundling of ESCOM into two companies one for generation and another for transmission and distribution. d) Ensure energy statistics are compiled by all institutions mandated to do so and collected by DoE and that these are updated regularly in consultation with NSO e) Ensure NOCMA maintains liquid fuel stocks equivalent to 60 days' supply in the strategic reserves and that any	g) Create the Rural Electrification Authority as a semi-autonomous legal entity under an Act of Parliament and that its mandate includes renewable energy activities h) Ensure the policy implementation targets are achieved within the time frames indicated i) Carry out overall energy supply and demand forecasts with input from the single buyer transmission and distribution company on electricity side j) Mobilise resources to bring power (grid extension, mini grids or RE) to all rural public schools, health facilities and police units in Malawi k) Mount a vigorous campaign to

fuels withdrawal below 60 days supply must be done only with written approval of the Minister and not otherwise. f) Ensure that coal powered generation power plants do not cause harmful emissions beyond the set limits.	educate the masses on the importance of improved cook stoves, brick kilns and charcoal kilns. l) Oversee the restructuring of the liquid fuels market m) Annually tender out procurement of fuel for the nation

13.1.2 Department of Forestry

a) Ensure there is enough biomass supply to meet the needs of the population b) Ensure trees and other biomass resources are managed sustainably c) Ensure strict adherence to the criteria for granting licences for charcoal making d) Encourage people to grow fast growing trees including bamboos for domestic needs as well as commercial purposes.	e) Enforce the legislation on forestry and forestry products for sustainability of these resources. f) Ensure forests, whether national, community or village forests are managed sustainably and villagers are able to harvest from village forests for domestic needs g) Encourage communities to form cooperatives or other groupings for tree growing, charcoal making and tree harvesting and within the limits of the law.

13.1.3 Department of Mining

a) Promote and ensure environmentally friendly mining practices that ensure that emissions of harmful substances are limited to acceptable levels and pollution is minimised.	b) Promote the exploration and production of petroleum in Malawi. c) Ensure the Petroleum legislation is updated d) Manage the upstream activities of liquid fuels, coal.

13.1.4 Department of Environmental Affairs

a) To be strictly checking and measuring carbon emissions from energy operations such as coal fired power stations, cook stoves etc and keep records of the country's emissions. b) Ensure every project requiring environment impact assessment including energy projects have such assessment and strictly adheres to any impact mitigation measures	c) Report on the country's emissions and whether the country is achieving the set goals on emissions or not d) Ensure all are strictly adhering to the requirements of the Environment Management Act

13.1.5 Ministry of Natural Resources, Energy and Mining

a) Build capacity of: b) local private operators in the development of bankable off-grid project proposals as well as in accessing carbon financing; c) local financial institutions in appraising renewable energy power projects, especially community or decentralised ones; d) the MBS and MERA to support the development of renewable energy standards and certification schemes for installers; e) rural communities in entrepreneurial and technical skills in RE technologies and enterprises, targeting the equal participation of men and women; f) the DoE in renewable energy resource assessment; g) the DoE and Renewable Energy Agency in developing, implementing, budgeting for, monitoring and evaluating all renewable energy interventions from a social and gender perspective and building strong capacity in collecting and analysing sex disaggregated data; h) training institutions (Universities, technical colleges including the newly launched community colleges)	j) Agricultural NGOs, extension workers etc. to train low-income male- and female-headed households in the agricultural application of bio-slurry as a way of improving their food security. k) Establish an energy resources coordination directorate to coordinate all energy resources upstream and downstream to ensure smooth operation of these activities without conflict or gaps. l) Ensure legislation is put in place to give power to the said directorate to be coordinator and to lay down operational rules to be adhered by all institutions dealing with energy. Such institutions will be classified as lead agencies in respect of their subsector and to be enjoined to adhere strictly to their particular legal framework m) Such coordinating directorate shall also be coordinating biomass energy activities and act as a link between downstream and upstream issues and coordinate with other Ministries such as Forestry, Water, Lands and Agriculture. n) Enact the Energy (Improved Biomass Cook Stoves) Regulations under the Energy Regulation Act.

to train more male and female professionals, technicians and artisans in RE development (where applicable), installation and maintenance; i) RE training institutions to deliver gender mainstreaming modules in their programmes in order to institutionalise gender responsive approaches to RE; and	o) Ensure availability of sufficient ethanol in all filling stations for blending and non blending purposes. p) In liaison with MERA ensure oil marketing companies are holding fuel stocks equivalent to 15 days of their average sales.

13.1.6 Single Buyer Transmission and Distribution Company

This company shall be responsible for the following: a) It shall own, operate and maintain transmission lines b) It shall be the Single Buyer of power such that all generation companies shall sell all their power to it and it shall sell the power to large customers or sell power to customers through the Distribution division.	c) It shall do power trading, including being the sole importer and exporter of power. d) It shall do system planning including determining the generation and transmission expansion projects timing, and generally electricity demand and supply forecasting. e) It shall manage the tendering and award of new generation stations whether under IPP system or PPP arrangements in liaison with other competent authorities

These responsibilities are further expanded in the implementation matrix below.

13.2 Implementation Plan

Refer to Appendix 1.

13.3 Monitoring and Evaluation

Refer to Appendix 2

13.4 Policy Review

Issues of energy in terms of technology, policy, legislation, commitments at country level, regionally and at global level are going through rapid changes. It will therefore be very important to continue reviewing the policy periodically to ensure it remains relevant and

keeps pace with those developments at all times. This policy shall therefore be reviewed every five years.