



# **THE REPUBLIC OF MALAWI COUNTRY REPORT**

**PRESENTED AT JICA INTERNATIONAL CENTRE**

**TOKYO, JAPAN  
2<sup>ND</sup> – 22<sup>ND</sup> JUNE, 2013**

**Status of Energy Policy in Malawi**

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# Malawi: A Country Overview



- **Population:** 13.1m (2013) growing at 2.8%
- **GDP (nominal):** growing 5.2 2013
- **Per capita:** \$328 (2011 )
- **Imports:** \$1.625 billion (2009 est.)  
*petroleum products, consumer goods, equipment*
- **Exports:** \$945 million (2009 est.)  
*tobacco (53%), tea, sugar, cotton, coffee, peanuts, wood products*
- **Main towns:** *Population, (2008; EIU est.)*
  - Lilongwe: 890,000
  - Blantyre: 750,000
  - Mzuzu: 190,000
  - Zomba: 101,000

# STATUS OF ENERGY SECTOR



- **Growth indicators – Malawi**
  - 2013 Growth Domestic Product (GDP) at 5.2%
  - Malawi`s population is now 13.1 million, with an estimated growth rate of 2.8%
  - Only 9.8% of population have access to electricity
  - Access in rural areas is less than 1%
  - 87% of energy is from biomass therefore Serious deforestation and Environmental degradation.
  - Women spend more time and energy fetching firewood

# STATUS OF ENERGY SECTOR



- ▣ Regarding Electricity, the total installed power generation capacity is 287MW.
- ▣ The majority of this power is generated from hydro (99%) mainly from Shire River.
- ▣ Only one small mini hydropower on Wovwe River in the North, which is generating 4.5MW.
- ▣ Power transmission is at 132kV and 66kV and only extends to major cities.
- ▣ Power distributed to rural areas is done through 33kV and 11kV lines.
- ▣ Nationally, electricity access rate is at 8% while in rural areas, access rate is still less than 1%.
- ▣ Large investment potential for the development of hydropower generation from a number of perennial rivers, potential for coal fired, nuclear power, solar and wind power

# CHALLENGES

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- Capital finance shortage manifested in lack of investment in generation, transmission, distribution and overall power system stability
- Aging generation equipment leading to frequent breakdowns and blackouts
- Low power generation capacity – making Malawi an unattractive investment destination and increasing cost of doing business in Malawi due to use of expensive alternative power sources
- Environmental degradation affecting hydro power generation hence redirection of resources to combat the effects environmental degradation
- Limited internal storage facilities exposing the country to frequent fuel supply shortages



# CHALLENGES

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- high cost of transportation (petroleum)
- High global prices of oil leading to rising retail prices
- Infant renewable energy industry which requires nurturing
- Vandalism of installations and infrastructure
- Forex constraints

# NATIONAL ENERGY GOALS



- Government has prioritized energy generation and supply as one of the priority areas (MGDS II & ERP) to stimulate economic growth. Specific goals are:
  - ▣ Make the energy sector sufficiently robust and efficient to support GoM's socio-economic agenda of poverty reduction, sustainable economic development, and enhanced labour productivity.
  - ▣ Catalyse the establishment of a more liberalized, private sector driven energy supply industry in which pricing will reflect the competition and efficiency that will develop in the reform process; and
  - ▣ Transform the country's energy economy from one that is overly dependent on biomass to one with a high modern energy component in the energy mix.

# ENERGY STRATEGIC OBJECTIVES



- improve efficiency and effectiveness of the commercial energy supply industries;
- improve the security and reliability of energy supply systems;
- increase access to affordable and modern energy services;
- stimulate economic development and rural transformation for poverty reduction;
- Improve energy sector governance; and
- mitigate environmental, safety, and health impacts of energy production and utilization.
- Increase the number of households with electricity 30% by 2020 and 40% by 2050;
- Attract private capital and participation
- Enable the ESI effectively participate in regional electricity trading through



# **POLICY STRATEGIES-ESI**



- **Rehabilitation and upgrading of existing power stations**
- **Construction of new 220-330 kV backbone North South transmission lines (one on East and West)**
- **Rehabilitation and expansion of the existing transmission and distribution system**
- **Demand-side management activities to reduce peak demand growth**
- **Weed and siltation management**
- **Policy and regulatory review to encourage private sector generation and adoption of vandal free technologies**
- **Capacity building**
- **Connecting to the SAPP**

## **POLICY STRATEGIES-LF&G**

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- ✦ Internal storage capacity using Government and Private facilities to increase from the present 6 days cover to a minimum of 30 days
  - . (a regime of incentives and penalties for non-compliance being developed by MERA)
  - Building strategic reserves
- ✦ Plans under consideration to construct a fuel pipeline from Mozambique
- ✦ Plans in advanced stages to promote increased use of LPG at household level to be promoted
- ✦ Ethanol-Petrol blending ratio under review with a possibility of increasing from 10:90 to 20:80
- ✦ Jatropha based Biodiesel production promoted

# PRIVATE SECTOR PARTICIPATION



- ESCOM is currently the sole electrical power supply service provider which owns the entire generation, transmission and distribution network in the country.
- The Malawi Energy Policy (MEP) of 2003 and the Energy Laws of 2004 as reviewed in in 2008 provide for private sector involvement in electricity generation either as:
  - ✦ Independent Power Producers (IPP)
  - ✦ Public Private Partners (PPP)
  - ✦ Build, Own, Operate and Transfer (BOOT)
- GoM has drafted the Feed In Tariff Policy to guide Private Sector Investment

# EXAMPLES OF INTERVENTIONS



- Implementation of Kapichila phase II to generate additional 64 MW
- Conduct feasibility studies for different sites for hydropower development
- Rehabilitate and upgrade transmission & distribution substations in Malawi
- Rehabilitate already existing hydropower station along shire River- Nkula A
- Conduct feasibility studies for Coal Power Generation
- Raising competition by
  - ▣ Connecting to power pool;
  - ▣ Providing for new capacity through Independent Power Producers;
  - ▣ Providing for outsourcing of certain services such as billing and revenue collection, supply and warehousing of spare parts.



# Short Term Investment Plans

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- Short term solutions which have been identified due to their gestation period are:
  - demand side management,
  - installation of peaking thermal (HFO/Diesel) power plant,
  - Construction of Kapichira Phase II hydropower plants.
  - undertaking of comprehensive feasibility studies on potential hydro power sites.

# Demand Side Management

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- Government is implementing the Demand-Side Management (DSM) programme which involves;
  - Implementation of time of use tariffs to reduce demand at time of system peak;
  - installation of programmable Maximum Demand (MD) Meters ;
  - promotion and facilitation of use of CFLs.
  - Implementation of feeder metering by installing meters on distribution feeders.
  - Construction and maintenance of distribution and transmission lines to reduce transmission losses.

# Power Sector Reform Strategy



- ▣ The main thrust of the Power Sector Reform Strategic plan was the vertical separation of the ESI market structure into natural segments of
  - ▣ generation,
  - ▣ transmission and
  - ▣ distribution markets.
- ▣ Pricing Models: Cost Recovery, Efficiency Caps + Return on Investment
- ▣ This was considered strategic to the attainment of the twin policy goals of efficiency and effectiveness through competition and private sector participation including the development of new power generation capacity.
- ▣ The reforms would allow Malawi to benefit from the evolving regional power pool market through SAPP in form of power trading if the country is interconnected with neighboring countries.

# Role of Government

- **Set policy framework and commercial environment under which the ESI operates (level playing field);**
- **Ensure accountability and transparency in the ESI;**
- **Monitor set targets for the ESI through performance bonds;**
- **Ensure that new hydropower plants comply with international agreements on water riparian rights;**
- **Ensure that all power project in generation, transmission and distribution meet environmental standards & approval procedures.**



# REGULATION AND ROLE OF GOVERNMENT

- ▣ GoM has recognized that effective regulation is key to the ESI reforms
- ▣ In this regard , GoM has established MERA which is supposed to be independent , transparent, lean and effective as required by the reforms in the Energy Policy
- ▣ GoM has also anchored MERA on all three aspects of regulation
  - ▣ Economic Regulation
  - ▣ Technical Regulation
  - ▣ Legal Regulation

# Liquid Fuels & Gas Industry Structure



## Production Activities to be licensed

- a) Production of crude oil and gas
- b) Refining of crude oil
- c) Production of ethanol fuel
- d) Production of bio-diesel

# Liquid Fuels & Gas Market Structure *cont...*



## Supply Activities to be licensed

- a) Importation of liquid fuels and gas
- b) Wholesaling
- c) Storage
- d) Transportation
- e) Retailing

# Medium Term Investment Plans

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- Malawi/Mozambique Power Interconnection
- construction of coal fired power plant,
- Construction of 8 hydropower plants,
- Construction of 2 biomass fired power plants and
- construction of 2 wind power systems.

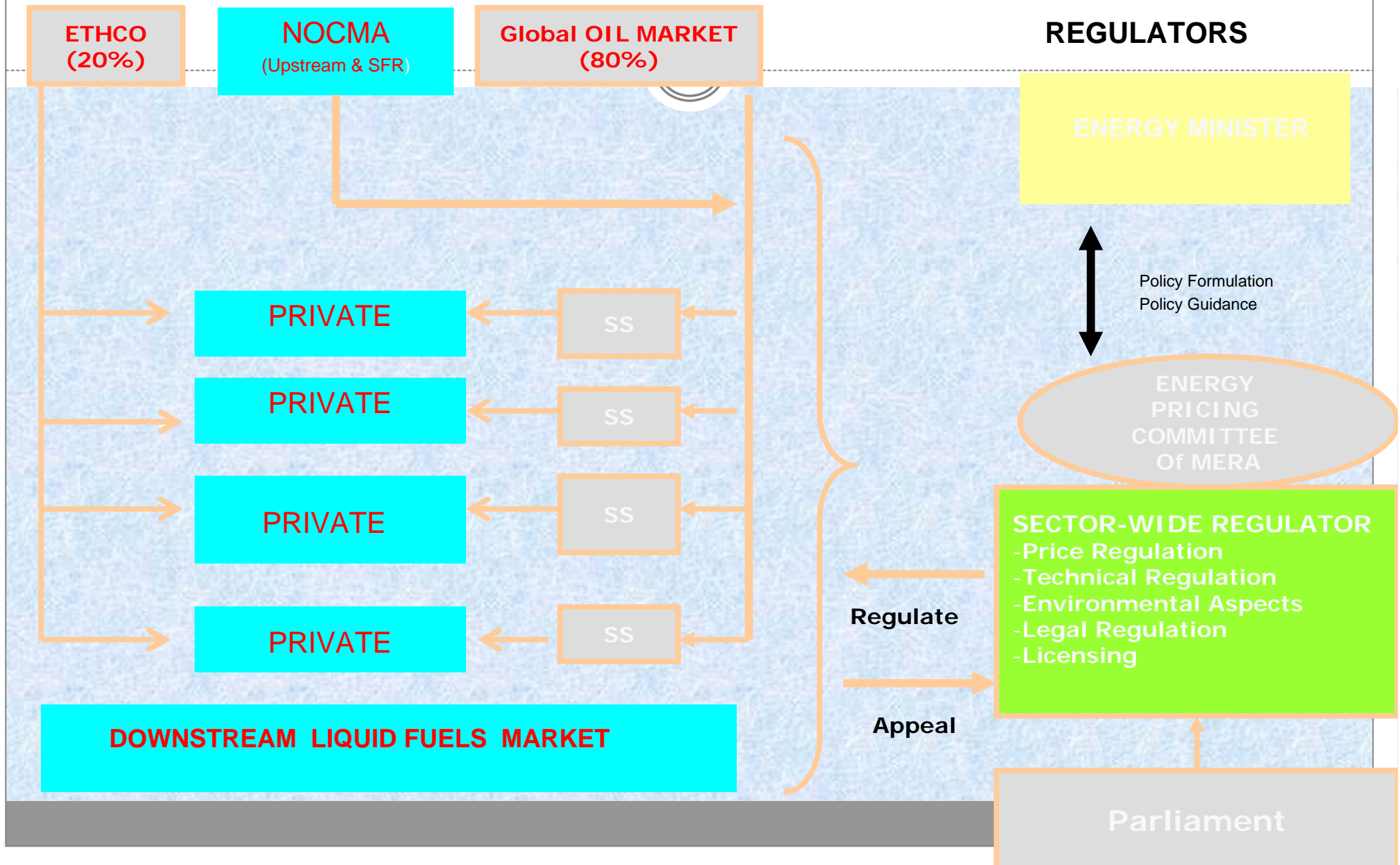


# Energy Mix Projections 2000 - 2050

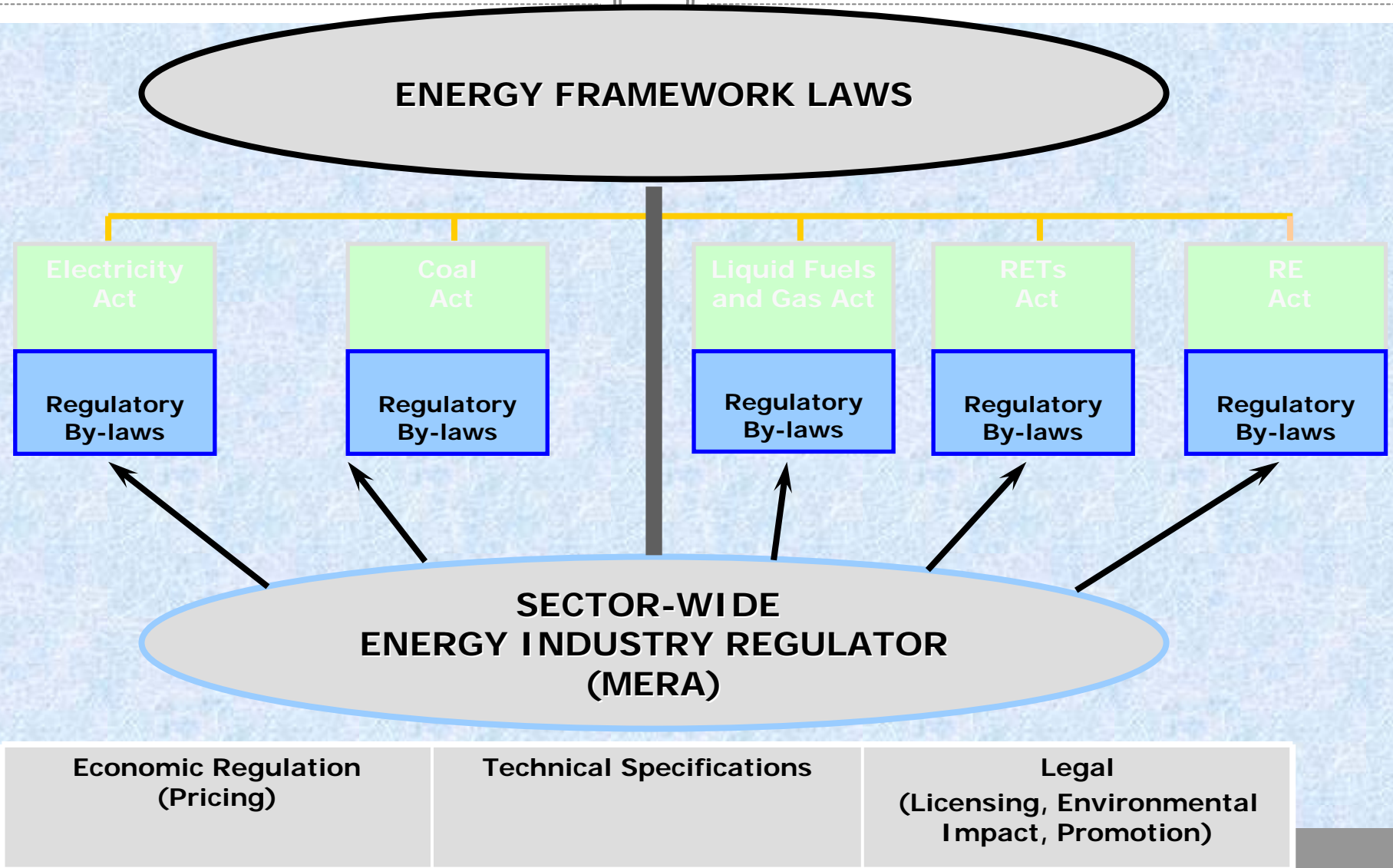


	<b>2000</b>	<b>2010</b>	<b>2020</b>	<b>2050</b>
<b>Biomass</b>	93.0	75.0	50.0	30.0
<b>Liquid Fuels</b>	3.5	5.5	7.0	10.0
<b>Electricity</b>	2.3	10.0	30.0	40.0
<b>Coal</b>	1.0	4.0	6.0	6.0
<b>Renewables</b>	0.2	5.5	7.0	10.0
<b>Nuclear</b>	0.0	0.0	0.0	4.0
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

# LF&GSI New Market Structure



# Ultimate Energy Sector Legal Framework



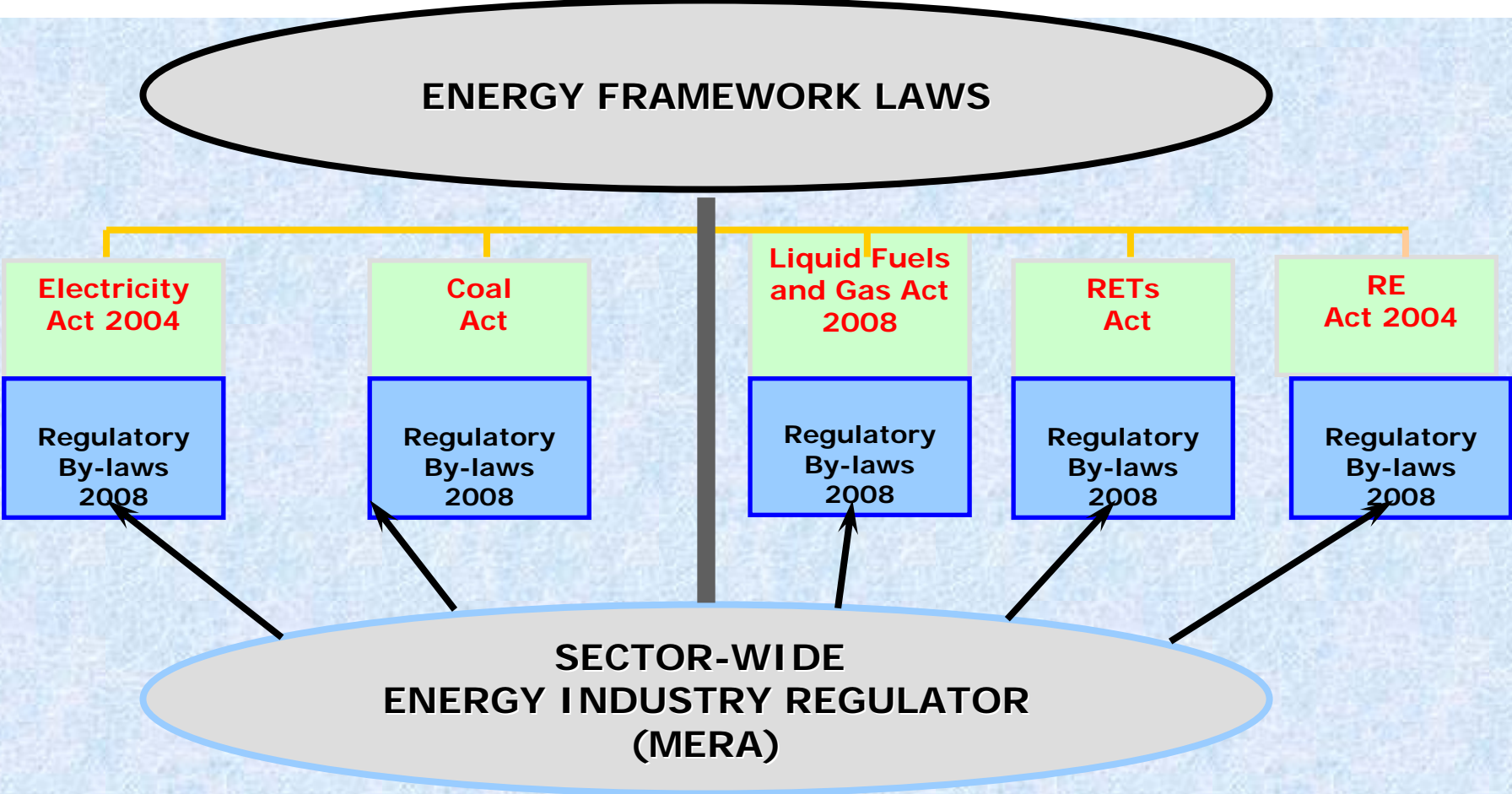
# **INSTITUTIONAL, LEGAL & REGULATORY FRAMEWORK**



- The Ministry of Energy is responsible for policy and coordination of the energy sector.
- This sector is guided by Mw Energy Policy of 2003, the Energy Regulation Act of 2004, Rural Electrification Act of 2004, Electricity Act of 2004, Liquid Fuels and Gas Production and Supply Act of 2004
- Both the Policy and the Energy Laws encourage the participation of private sector in electricity generation & distribution
- Mw Energy Regulatory Authority (MERA), an independent body, regulates energy in accordance with the Energy Laws



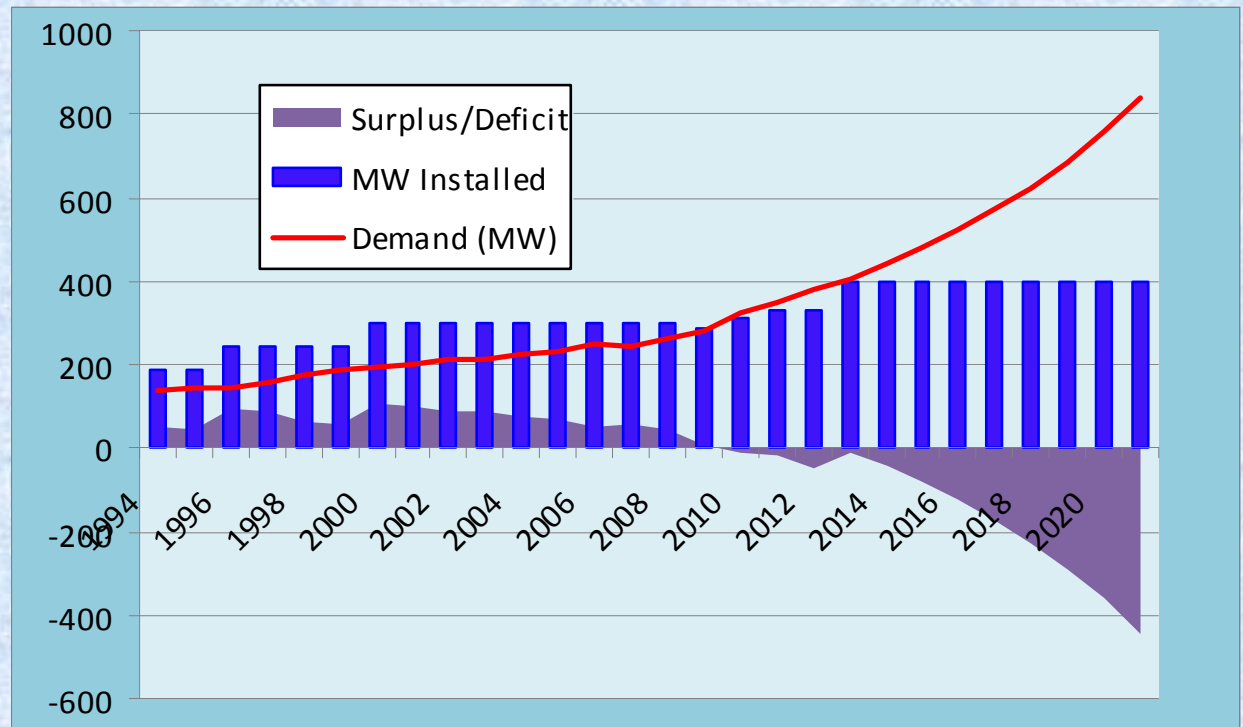
# Energy Sector Legal Framework



Economic Regulation (Pricing)	Technical Specifications	Legal (Licensing, Environmental Impact, Promotion)
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# ELECTRICITY DEMAND AND GENERATION CAPACITY IN MALAWI

- The current electricity demand in Malawi stands at 347 MW. The current installed capacity stands at 283.5 MW
- It is projected that demand will be 598 MW in 2015, 874 MW in 2020 , 1193 MW in 2025



# **CURRENT ENERGY DEMAND GROWTH DRIVERS**

- **Mining Sector (minimum of 800MW)**
- **The Green Belt Irrigation Initiative (minimum of 130MW)**
- **Service – ICT, Tourism, Banks, Hospitals, Offices and education (minimum of 500MW)**
- **Manufacturing and processing (minimum of 700MW)**
- **Domestic Demand (minimum of 700MW)**

# POTENTIAL ENERGY SOURCES

## Hydro

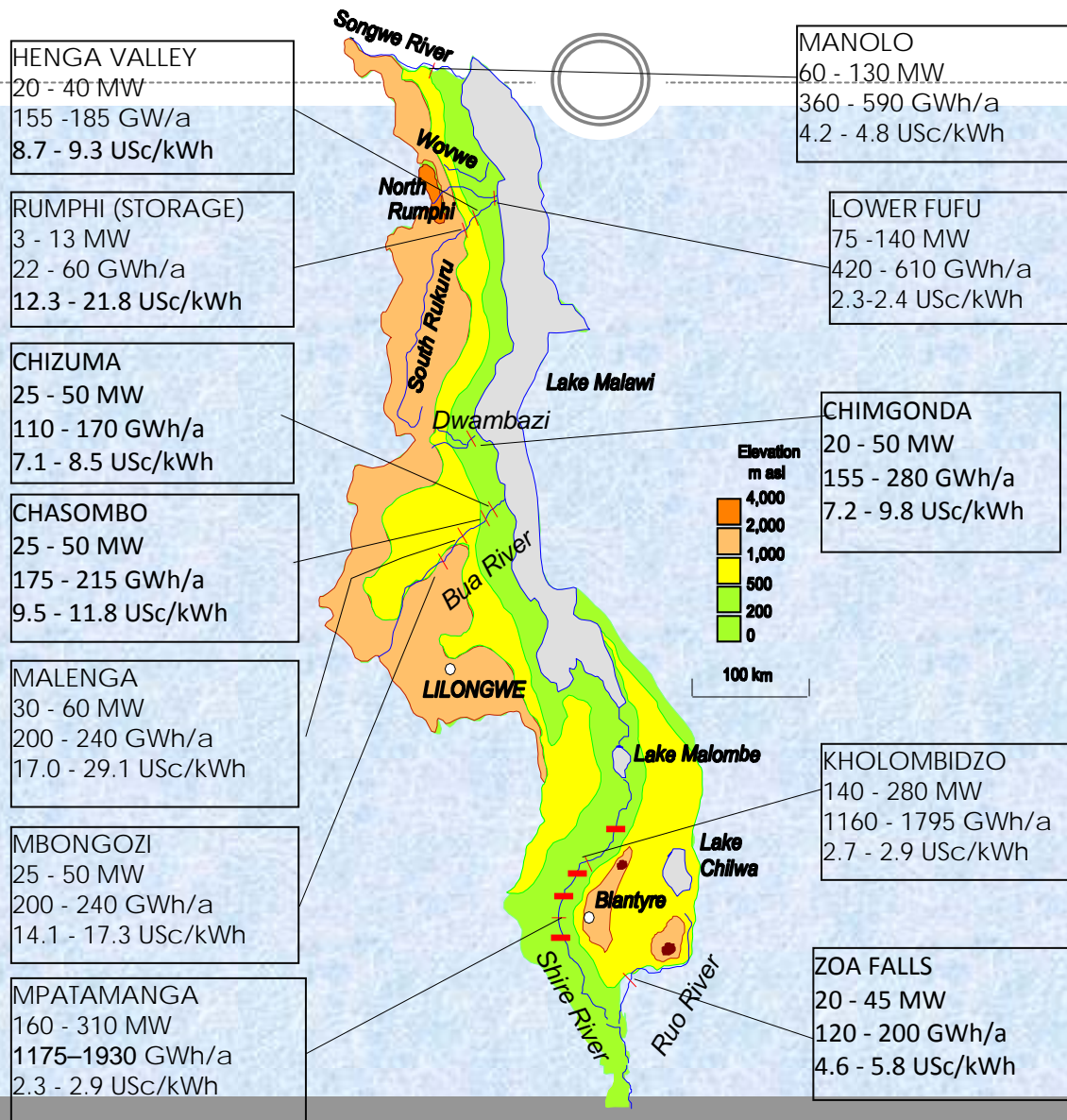
- The untapped hydro power potential in Malawi is over 2000MW
- Currently, Government is conducting feasibility studies for hydropower development at Mpatamanga in Mwanza, Lower Fufu in Rumphu Kholombidzo in Blantyre and Chingonda, Chasombo and Chizuma in Nkhotakota
- These sites have potential ranging from 50 – 300MW
- They are earmarked for IPPs OR PPPs



# PRIORITY POWER GENERATION PROJECTS

Project	Potential Capacity (MW)	Est.Cost (USc/kWh)	Annual Energy (GWh)
<b>Lower Fufu (hydro)</b> Only Feasibility Study funded	100 -175	2.3 - 2.4	420 – 660
<b>Mpatamanga (hydro)</b> Only Feasibility Studies funded	160 -310	2.3 - 2.9	1175–1930
<b>Chimgonda (hydro)</b> Only Feasibility Studies funded	20- 50	7.2-9.8	155-280
<b>Kholombizo (hydro)</b> Only Feasibility studies funded	140-280	2.7-2.9	1160 -1795
<b>Malenga (hydro)</b> Feasibility studies required	30-60	17-29.1	200-240
<b>Chasombo- (hydro)</b> Feasibility studies required	25-50	9.5-11.8	175-215
<b>Chizuma (hydro)</b> Feasibility studies required	25-50	7.1-8.5	110-170

# POTENTIAL HYDRO SITES



# POTENTIAL ENERGY SOURCES Cont'd



## Wind & Solar Energy

- Malawi has a large potential for wind and solar power generation with wind speeds ranging from 3-10m/s and solar irradiation of 21.5MJ/m<sup>2</sup>.
- However, there is need to conduct a resource mapping exercise to determine location and frequency.
- Currently, the Ministry is implementing a pilot Village Electrification project, using wind – Solar hybrid systems.
- The total installed capacity is 132 kW of which 90 kW is from wind.
- However, large capacity wind turbines in the range of 5MW in a wind farm of 20 Wind Turbines would total to 100MW of wind generation which would add 35% of Electricity generation in the country

# POTENTIAL ENERGY SOURCES Cont'd



## **Biomass**

- GoM is encouraging the sugar and tea industry to invest in electricity production through use of biomass.
- Currently, Illovo companies are generating electricity for own use using bagasse.
- The generation capacity is about 18 MW (11 MW at Nchalo and 7 MW at Dwangwa )
- There is potential to generate an additional 100 MW from these sugar factories.
- In the Tea and Timber Industry, wood is the main source of boiler fuel used to generate steam .
- This steam can also be used to generate electricity



# OTHER POTENTIAL POWER GENERATION PROJECTS

<b>Project</b>	<b>Potential Capacity (MW)</b>	<b>Est. Cost (MUSD)</b>	<b>Est. Cost (USc/kWh)</b>	<b>Annual Energy (GWh)</b>
<b>Wind Energy Project-</b> Feasibility studies require	150	5	?	?
<b>Solar Energy Project-</b> feasibility studies required	50	3	?	?
<b>Cogenerations-</b> Feasibility Studies Required	100	70	?	?

# LEARNING AREAS OF INTEREST

- ❑ **EXPERIENCE FROM OTHER COUNTRIES**
- ❑ **ENERGY AND OTHER RESOURCE DATA MANAGEMENT**
- ❑ **EFFECTIVENESS OF INSTITUTIONAL AND REGULATORY FRAMEWORKS**
- ❑ **EFFECTIVE SHORT TERM INTERVENTIONS TO PROMOTE PRIVATE SECTOR PARTICIPATION**
- ❑ **MEASURES TO BUILD CAPACITY IN THE REGULATION AND OPERATION OF THE SECTOR**