

GRID EMISSION FACTOR FOR MALAWI: WHERE ARE WE?

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Outline of presentation

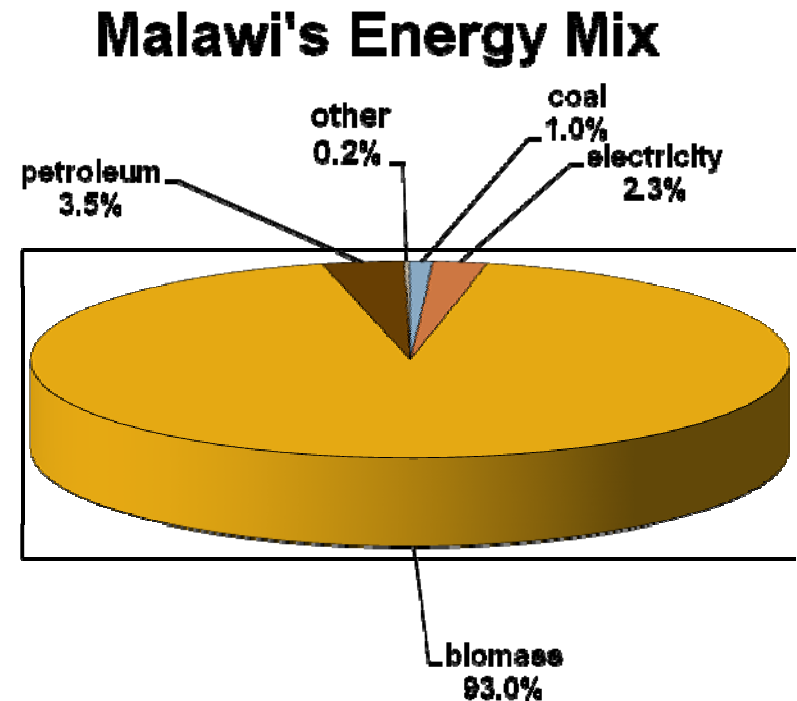


- Malawi's Energy Mix
- Energy Forecast
- What is GEF?
- Regional GEFs
- Malawi's Status
- Way Forward

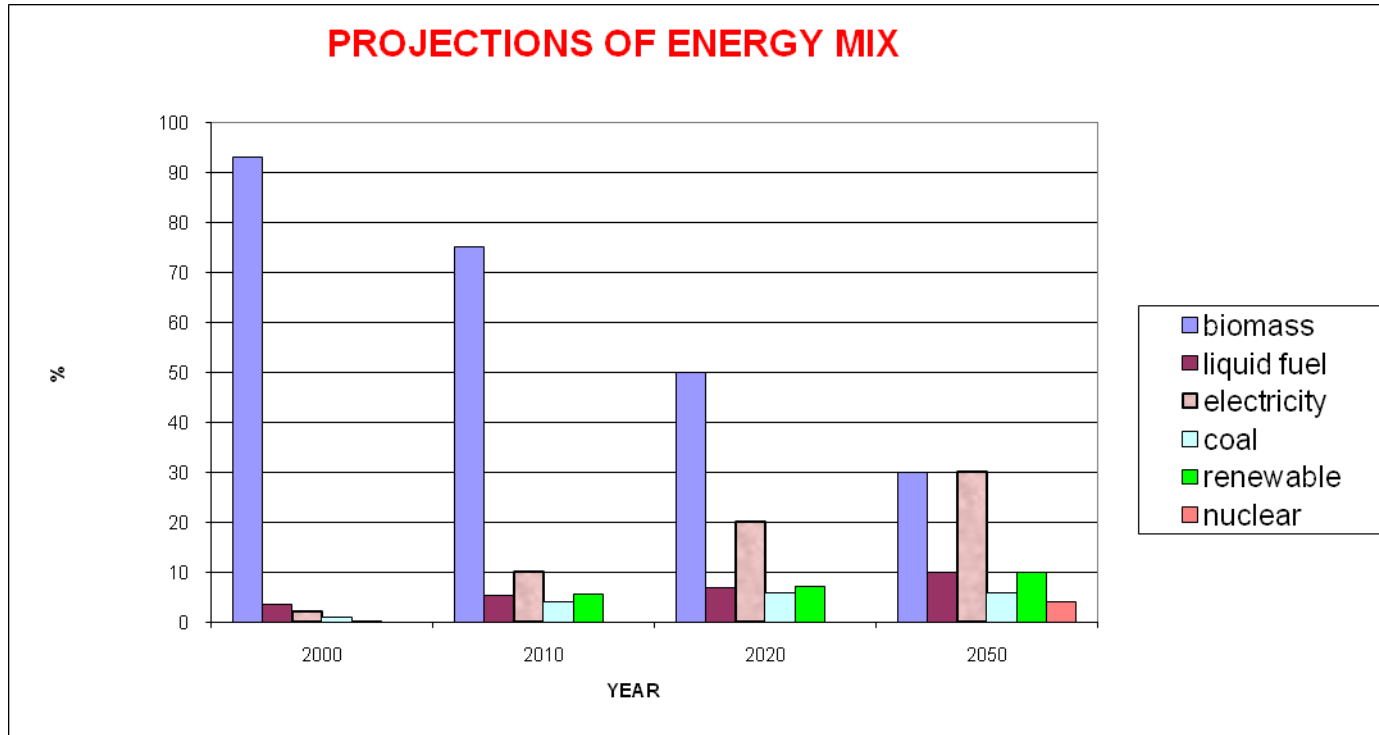
1. MALAWI ENERGY RESOURCES

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- Biased towards biomass (wood and charcoal)
- Forest resources under extreme stress
- National grid electricity is from HEP
- RES potential high but under exploited
- Energy Policy in place



2. ENERGY MIX PROJECTIONS

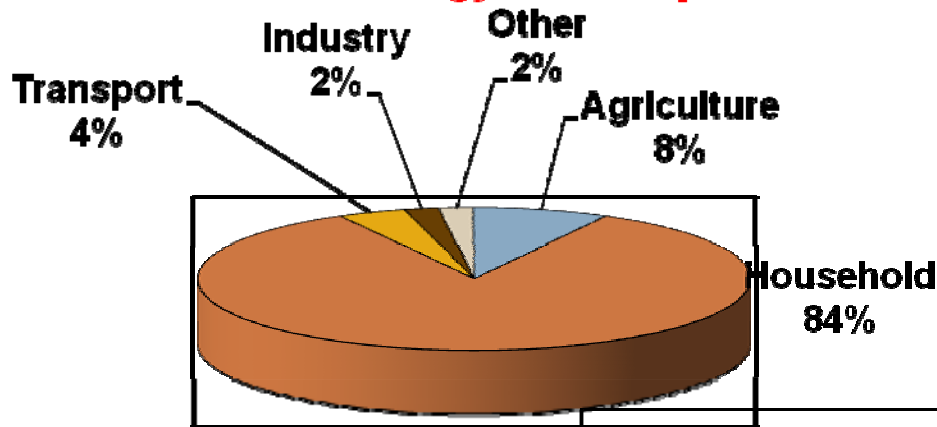


Source: Energy Policy, DoE

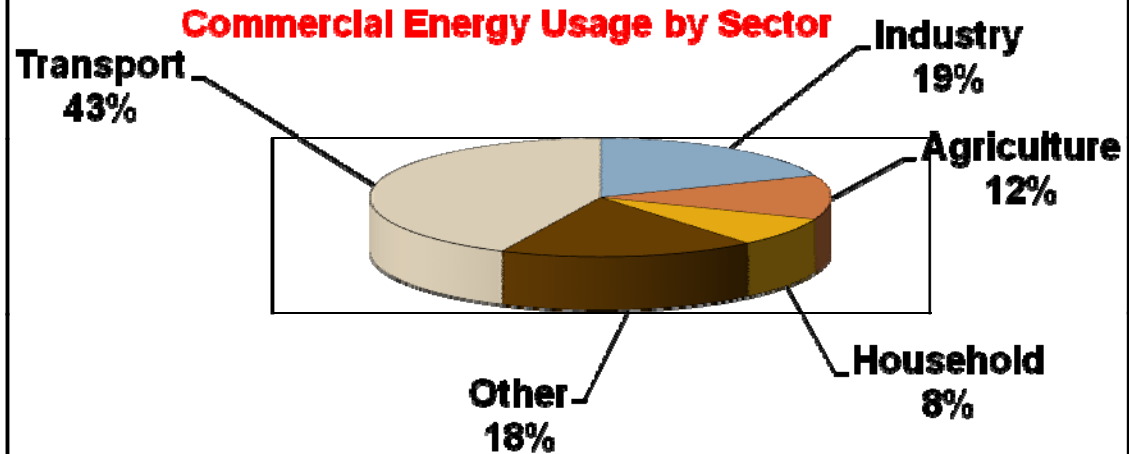
3. MAJOR USERS

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Sectoral Energy Consumption



Commercial Energy Usage by Sector



4. ELECTRICITY DEMAND VS SUPPLY

- Currently demand exceeds supply by far;
- Resulting in frequent power black outs and inability to connect new subscribers;
- Only 6 to 7% of Malawians are connected to grid electricity;
- Furthermore, the country has seen significant standby generation capacity from petrol/ diesel gen-sets.

5. ENERGY OPTIONS FOR MALAWI

- Increase HEP generation
- Diesel powered plants (1 in each region)
- Interconnection to SAPP
- Coal fired power plants
- Nuclear power plant

GRID EMISSION FACTOR

- Carbon based fuel sources such as coal and petroleum products emit “dirty” greenhouses;
- A unit quantity of a particular source would emit different amounts of emissions when combusted:
 - ▣ FN of quality of fuel, technology etc
- Grid Emission Factor (GEF) is a measure of how clean or dirty your national grid electricity is;
- It is measured in terms of tonnes of carbon dioxide (tCO_2) emitted per Megawatt-hours (MWh) of energy produced from the whole range of plants, technologies and carbon based sources.

GRID EMISSION FACTOR

$$GEF = \frac{\sum EG_{m,y} \cdot EF_{EL,m,y}}{\sum EG_{m,y}}$$

- GEF- grid emission factor (tCO₂/MWh)
- $Eg_{m,y}$ – electricity generated and delivered to the grid by power unit m in year y
- EF- emission factor of power unit m in year y (tCO₂/MWh)
- m- all relevant power units in year y
- y- the relevant year

METHODOLOGY

- STEP 1. Identify the relevant electricity systems.
- STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional).
- STEP 3. Select a method to determine the operating margin (OM).
- STEP 4. Calculate the operating margin emission factor according to the selected method.
- STEP 5. Identify the group of power units to be included in the build margin (BM).
- STEP 6. Calculate the build margin emission factor.
- STEP 7. Calculate the combined margin (CM) emissions factor.

GEF FOR MALAWI

- Malawi is currently producing all her electricity from hydro;
- It is not yet interconnected to SAPP
- The figure of ZERO is being quoted
- We can safely say unknown/ not computed
- Malawi has seen significant increase in standby generation in recent years

Table 1: Summary of the National- and SAPP GEFs

No.	Country	National Emission Factor (in tCO ₂ /MWh)	SAPP Emission Factor (in tCO ₂ /MWh)
1	Botswana	1.0824	1.0136
2	DRC	0.0000	
3	Lesotho	0.0038	
4	Mozambique	0.7198	
5	Namibia	0.9733	
6	RSA	1.0212	
7	Swaziland	0.7960	
8	Zambia	0.0087	
9	Zimbabwe	0.5579	

Data: All calculations are based on data covering the most recent three years, 2008-2010.

Out of the SAPP connected members, only DRC is a net exporter

CONCLUSIONS

- The issue of when Malawi would be connected to the SAPP is a matter for the Government to decide.
- At the current generation capacity, the interconnection will afford Malawi access to the regional resource and potentially improve the quality of services from the electricity subsector;
- IF Malawi is to benefit from the carbon market, then there must be significant invest in HEP generation and aim at becoming a net exporter of electricity.

Way forward for Malawi

- UNFCCC methodologies available;
- We need accurate data for off-grid power units for us to be able to compute our GEF;
 - Types of power units
 - Location
 - Technical details
 - Characterisation/tech details of fuels
 - Existing and those proposed
- There is need to institutionalize data collection (DoE & MERA)