MALAWI ENERGY REGULATORY AUTHORITY

MALAWI FEED-IN TARIFF POLICY

RENEWABLE ENERGY RESOURCE GENERATED ELECTRICITY IN MALAWI

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List of Acronyms

EOI	Expression of Interest
ESCOM	Electricity Supply Corporation of Malawi
IPP	Independent Power Producer
MERA	Malawi Energy Regulatory Authority
MW	Megawatts
NEP	National Energy Policy
O&M	Operation and Maintenance
PPA	Power Purchase Agreement
REFIT	Renewable Energy Feed-in-Tariff
RES	Renewable Energy Resource
RESE	Renewable Energy Resource Electricity

1.0 Introduction

The Government of Malawi recognizes that renewable energy sources (RES) such as small hydro, wind, biomass, biogas, solar, geothermal and municipal waste have the potential to increase the power supply and diversification of electricity generation sources in Malawi besides income and employment generation. The national energy policy which was approved by Government in 2003 and operationalized by the Energy Regulation Act of 2004 and other Energy Laws, encourages the promotion and development of these indigenous renewable energy sources to enhance the country's electricity supply capacity.

An assessment of small hydro resource potential carried out by the Ministry of Energy and Mining indicates that there are suitable sites for small hydro power development in the country. However there is need to carry out detailed feasibility studies to establish the economic viability of the said sites for power generation.

On the basis of the National *Energy Policy (NEP) of 2003,* the Malawi Government is committed to promoting electricity generation from Renewable Energy and is encouraging potential Independent Power Producers (IPPs) to carry out feasibility studies on renewable energy generation on the basis of which power purchase agreements can be negotiated.

In view of the time and resources required to undertake feasibility studies and bring the projects to financial closure, MERA has developed a guiding frame work on feed in tariffs for electricity generated from renewable energy sources; specifically hydro, wind, biomass, biogas, solar and municipal waste order to safeguard the investments made by the respective developers in data collection undertaking feasibility studies; and generally to boost the development of Renewable Energy Sources.

2.0 The feed in tariff tool

The feed in tariff is an efficient policy tool for driving the development of renewable energy. The feed in tariffs streamlines administrative procedures which help shorten the lead times, reduce bureaucratic overheads and minimize project costs.

REFIT allows power producers to sell renewable energy sources generated electricity to a distributor at a pre-determined fixed tariff for a given period of time. The Malawi Government guarantees third party access to the grid (Transmission and Distribution) pursuant to the

provisions of the Electricity Act of 2004. Renewable energy sources in the context of Malawi shall mean small hydro, wind, biomass, biogas, solar and municipal waste.

3.0 The objectives of the feed –in-tariffs system

Feed tariffs are intended to

a) Facilitate renewable energy resource mobilization by providing investment security and market stability for investors in electricity generation from Renewable Energy Sources.

b) Reduce transaction and administrative costs and delays by eliminating the conventional bidding processes.

c) Encourage private investors to operate their power plants prudently and efficiently so as to maximize returns.

Malawi Energy Regulatory Authority (MERA) reviewed both the cost and avoided cost based approaches to setting feed in price. It is observed that feed in tariffs based on avoided costs would leave end user tariffs un affected over the long term as this tariff would only motivate the development of technologies whose generation cost is lower than the avoided cost. On the other hand, feed in tariffs based on the cost of generation will eventually lead to higher end user prices through the cost recovery arrangement and may be above the avoided cost based tariffs. The feed in prices here in are based on the generation costs for the various technologies.

4.0 Design of feed-in-tariffs

Feed-In tariffs (FIT) is a set premium price for generated renewable electricity paid for each kWh of the power fed into the grid. The core provisions for the feed-in tariff framework include:

a) A defined set of eligible technologies
b) Tariff pricing differentiation by technology
c) A standard offer usually a contract for a guaranteed payment for guaranteed interconnection for all renewable generators
d) Payment over a long time frame usually 10 to 15 years
e) The investment costs for the plant,
f) The Operations and Maintenance (O&M) Costs
g) Fuel costs where applicable
h) Financing costs and return on the invested capital

i) Estimated lifetime of the power plant;

j) Amount of electricity to be generated

5.0 Benchmarks for renewable generators production costs;

Since generation costs differ for different renewable energy technologies, the Feed–in-Tariffs design provide technology specific tariff levels incorporating the electricity generation costs and a fair return on the investment based on the social- economic condition of the country and the regional experience.

The following renewable generation technologies were selected for assessment and review which formed the basis for the REFIT for Malawi;

a) Small scale hydro

b) Photovoltaic\Solar

c) Biomass Cogeneration

d) Wind

e) Geothermal

The level of premium required to make renewable energy project economically viable depends on the levelized generation cost (the price at which electricity must be generated from a specific source to break even) and the avoided cost of the systems at the point of injection. The levelized cost of electricity for renewable energy generation is a function of the technology, resource availability (solar radiation, wind speed, feedstock) and the availability of the infrastructure required for the transport and construction of renewable energy projects.

The renewable energy generation costs therefore formed the basis for the feed in prices at different load factors of energy availability. The Feed–in-Tariffs were calculated on either firm or non-firm basis and include the grid connection costs.

6.0 Feed-in-tariff for small hydro power generated electricity;

For the purposes of the feed-in tariff, hydro power plant means the hydro based power plants whose installed capacity is greater than 500kW but less than or equal to 10MW.

To attract private sector capital in small hydro resource electricity generation, MERA hereby establishes the feed-in-tariffs for small hydro power resource generated electricity.

A stepped fixed tariff for small hydro power generated electricity not exceeding the prices shown in the Table 2 below shall apply on electrical energy supplied in bulk to the grid operator at the interconnection point.

Table 2: stepped fixed tariff for small hydro power generated electricity

Power Plant Effective Generation capacity (MW)	**Firm Power Tariff (¢/kWh)**	**Non-Firm Power Tariff (¢/kWh)**
< 1	14.0	13.0
1 – 5	12.0	10.0
5 – 10	10.0	8.0

The tariffs shall apply for 20 years from the date of the first commissioning of the small hydro power plant.

The firm power tariff shall apply to the first 150MW of small hydro, firm power generating stations developed in the country.

The non-firm power tariff shall apply to the first 50MW of small hydro non-firm power generating stations developed in the country.

The tariffs shall apply to individual small hydro power plants whose effective generation capacity does not exceed 10MW.

7.0 Feed-in tariff for solar generated electricity

For the purposes of this tariff, solar refers to photovoltaic (PV) or thermal energy resource obtained from the sun.

Due to Malawi's strategic location in the tropics south of the equator, the daily average solar radiation is around 21.1MJ/m2.

To attract capital in solar energy resource electricity generation, MERA hereby establishes the Feed-in-Tariff for Solar Energy Resource generated electricity to be as follows.

Due to the relative high cost of this technology, it is intended to be used to supply the isolated/off-grid stations, to partly displace the thermal generation at Likoma and Chizumulo Islands. These isolated Islands are using very expensive diesel operated generators.

A fixed tariff not exceeding **US Cents 20.0 per Kilowatt-hour** of electrical energy supplied in bulk to the grid operator at the connection point. This tariff shall apply for 20 years from the date of the first commissioning of the solar power plant.

These tariffs shall apply to the first 100 MW of power generated using solar resource.

A non-firm power fixed tariff not exceeding US Cents 10.0 per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the connection point. This tariff shall apply for 20 years from the date of the first commissioning of the solar based power plant.

The non-firm power tariff shall apply to the first 50MW of non-firm power generating, solar based power plants developed in the country.

This tariff shall apply to individual solar power plants whose effective generation capacity are equal to or more than 500kW and does not exceed 10MW, subject to clause 10.7 and 10.8.

8.0 Feed-in tariff for biomass generated electricity

For the purposes of this tariff, biomass refers to plant or animal based energy resource and includes agricultural waste, municipal waste, biofuels and fuel wood.

Pre-feasibility studies on cogeneration from *bagasse* i.e. sugarcane waste, by the Sugar Companies have established that there is potential for immediate development of about 100 MW from the use of

bagasse produced at the two sugar factories operating at Dwangwa in Nkhotakota and at Ntchalo in Chikhwawa.

Potential investors have also shown interest in other forms of biomass including, wood waste at Chikangawa Forest and municipal waste in cities.

To attract private sector capital in biomass energy resource electricity generation, the Malawi Energy Regulatory Authority hereby establishes the Feed-in-Tariff for Biomass Energy Resource generated electricity.

A firm power fixed tariff not exceeding **US Cents 10.0 per Kilowatt-hour** of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the Biomass power plant.

Where biomass is used together with fossil fuels for the purposes of producing firm power, Biomass shall contribute not less than 70% of the annual fuel consumption, otherwise non-firm power tariff shall apply.

The firm power tariff shall apply to the first 200MW of firm power generating, biomass based power plants developed in the country.

A non-firm power fixed tariff not exceeding **US Cents 8 per Kilowatt-hour** of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the Biomass power plant.

The non-firm power tariff shall apply to the first 50MW of non-firm power generating, biomass based power plants developed in the country.

The tariffs shall apply to individual biomass power plants whose effective generation capacity above 500kW and does not exceed 100MW.

9.0 Feed-in-tariff for wind generated electricity

The *Wind Energy Resource Mapping of Malawi* gives indicative information about the wind potential in various parts of the country. The wind maps provide broad information on a national scale. Therefore detailed feasibility studies are required for each site, since wind energy resource potential is site-specific.

Detailed feasibility studies to establish the technical and financial viability of wind power generation at promising sites have to be undertaken with due regard to the special characteristics of wind energy resources.

To attract private sector capital in wind resource electricity generation, the Malawi Energy Regulatory Authority hereby establishes the Feed-in-tariff for Wind Energy Resource generated electricity.

A fixed tariff not exceeding **US Cents 13.0** per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the interconnection point.

This tariff shall apply to individual wind power plants (wind farms) whose effective generation capacity is above 500kW and does not exceed 50MW.

This tariff shall apply to the first cumulative 200MW capacity of Wind power plants developed in the country under this tariff policy.

This tariff shall apply for 20 years from the date of the first commissioning of the wind power plant.

10.0 Feed-in-tariff for geothermal generated electricity

For the purposes of this tariff, geothermal refers to natural thermal energy resource obtained from heat in the upper crust of the earth surface.

The Energy Policy of 2003 has highlighted the importance and contribution of geothermal in the energy mix. The Government of Malawi recognizes that accelerated development of geothermal resources will require joint effort from both public and private sectors.

The country's Electricity Investment Plan envisions the development of at least 50MW of geothermal generation capacity by year 2050.

The potential for geothermal generated electricity in the country is about 100 MW located mainly on the shores of Lake Shore which is on the Rift Valley.

To attract private sector capital in geothermal energy resource electricity generation, the MERA hereby issues the Feed-in-Tariff for geothermal Energy Resource generated electricity.

A fixed tariff not exceeding **US Cents 10.5** per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the

interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the geothermal power plant.

This tariff shall apply to the first 200 MW of geothermal power capacity developed in the country under this tariff policy.

The tariffs shall apply to individual geothermal power plants whose effective generation capacity will not exceed 50 MW.

11.0 Feed-in-tariff for biogas generated electricity.

For the purposes of this tariff, biogas refers to gas based energy resource and includes agricultural waste and municipal waste.

Recent studies estimate the potential for immediate development of about 130 MW from the use of municipal waste, sisal and coffee production among others.

To attract private sector capital in biogas energy resource electricity generation, the Malawi Energy Regulatory Authority hereby issues the Feed-in-Tariff for Biogas Energy Resource generated electricity.

A fixed tariff not exceeding **US Cents 10 per Kilowatt-hour** of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the Biogas power plant.

This tariff shall apply to the first 100MW of power generated using biogas.

A non-firm power fixed tariff not exceeding **US Cents 8 per Kilowatt-hour** of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the Biogas power plant.

The non-firm power tariff shall apply to the first 50MW of non-firm power generating, biogas based power plants developed in the country.

This tariff shall apply to individual biogas power plants whose effective generation capacity are equal or above 500kW and does not exceed 50MW.

12.0 Connection Obligations

The Feed-in-Tariffs include interconnection costs – transmission, substations and associated equipment - therefore grid system

operators shall connect plants generating electricity from renewable energy sources specified in this document.

11.2. Where necessary, the grid system operator shall construct or upgrade its grid at a reasonable economic expense to facilitate interconnection. The interconnection costs including transmission/distribution lines and substations construction or upgrading shall be recovered by the grid operator from tariffs charged on its customers.

13.0 Purchase Obligation

The grid system operator shall connect plants generating electricity from renewable energy sources and guarantee priority purchase, transmission and distribution of all electricity from renewable energy sources specified in this document.

Grid operator shall pay a tariff agreed upon between them and the power producer subject to the maximum tariffs and maximum capacities specified in this document.

Grid operator shall recover from electricity consumers 70% of the portion of the feed-in tariff except for solar which will be 85%, or as may be directed by MERA at the time of the approval of the PPA or review thereafter. This in other words, will be a pass-through cost

Power Producers and the grid system operator may agree by contract to digress from the priority of purchases, if the plant can thus be better integrated into the grid system. The parties shall seek approval for such variations from MERA.

14.0 Implementation Procedures

The following procedures shall apply in the implementation of the Feed-in-Tariff.

a) Private investors who wish to become power producers shall send an expression of interest (EOI) to MERA. The EOI shall include preliminary information such as the renewable energy source to be used, location in the country where the power plant is to be located, proposed installed capacity, indicative tariff, expected duration of plant development and any other information that the private investors wishes to disclose to facilitate decision making.

b) A Feed-in-Tariff Committee comprising representatives of MERA, the Ministry of Energy and Mining, Department of Energy Affairs and the

grid operator (ESCOM) will review the EOI. The purpose of the review is to determine how the proposed power plant can be integrated into the national power development plan and estimate suitability of proposed power plant location for interconnection including interconnection facilities and costs.

c) The results of the review shall be communicated to the private investor by the Feed-in -Tariff Committee within three months from the date of receipt of the EOI. The EOI may be accepted or rejected and where it is rejected, the reason for the rejection shall be provided.

d) Where the EOI is accepted and no further studies are required, the applicant shall be asked to provide a detailed proposal describing the technical and financial viability of the project, proposed financing arrangements, etc.

e) Where the EOI is accepted, the applicant shall be notified and given non-renewable rights of first refusal for the use of the same technology for power generation at the same location for a period of two years.

f) Where the EOI is accepted and further studies need to be carried out to determine project viability, the applicant shall be given 12 months to carry out and conclude the studies. Progress report shall be provided to the Feed-in-Tariff Committee after 6 months. Where the 6 months progress report shows that the project is not viable within the feed-in tariffs, the a project shall be abandoned and the rights of refusal will lapse.

g) Where the detailed proposal received under (d) or feasibility studies carried out under (e) **confirms** that the project is viable within the feed-in tariffs, the applicant shall be given another 6 months to **conclude** the studies and project development including engineering design, financing arrangements, and PPA (standard) negotiations with the grid operators etc.

h) Construction works of all projects to be implemented under the Feed-in-Tariff system shall commence within 6 months from the date of the signing of the PPA. The project shall be completed and commissioned within a period of 24 months from the date of the signing of the PPA.

15.0 Compliance Requirements

All projects implemented under the Feed-in-Tariff system shall comply with all other relevant technical, legal and regulatory requirements of the Government of Malawi.

16.0 Feed-in-Tariffs Policy Reviews

This Feed-in-Tariffs policy shall be subject to review every five years from the date of publication. Any changes that may be made during such reviews shall only apply to RESE power plants that shall be developed after the revised guidelines are published. This means that the revised guidelines and tariffs shall only apply to PPA contracts that shall be entered into after the revised tariffs have been published.

17.0 References

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