

RENEWABLE ENERGY FEED IN TARIFF STRATEGY



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FOREWORD

A viable energy sector plays an important role in the development of any economy. It is therefore important for the policy framework which is in place to be responsive to the changing needs of the sector.

The National Energy Policy (NEP) of 2008 seeks to ensure that the sector's potential to drive economic growth and reduce poverty is harnessed. However, the NEP requires additional frameworks and strategies to impact specific developments in the energy sector such as increasing the uptake of renewable energy.

The country with the help of its cooperating partners developed two master plans namely; the Rural Electrification Master Plan (REMP) and the Power Systems Development Master Plan (PSDMP) which indicated the country's hydro power potential standing at 6,000MW and mapped an implementation for the development of the hydropower potential and electrification of rural areas. However, this hydro resource potential estimated at 6000 MW is mainly based on large scale projects with capacity of 30MW and above while the small and medium projects of 20MW and below have been neglected.

The Renewable Energy Feed-in Tariff (REFiT) Strategy is therefore a government power sector initiative to accelerate private investments in small- and medium-sized renewable energy projects of up to 20 MW for increased access to clean energy services to supplement other government's power generation investment programs contained in the Power Systems Development Master Plan and other plans. The Strategy is a guide to Government's intention of developing the Renewable Energy subsector to supplement the large hydro energy sources which have been negatively affected by changes in the climatic trends, levels and patterns in the recent past.

The development of the REFiT Strategy was undertaken through a consultative process as a way of fostering collective involvement and effective participation of all relevant stakeholders. To ensure successful implementation of the Strategy, an implementation framework has been developed. It is my sincere hope that the REFiT Strategy will be widely read and used as a guide to Government's intention of expanding and diversifying the energy sector.

David Mabumba Minister

MINISTRY OF ENERGY



ACKNOWLEDGEMENTS

The Renewable Energy Feed-in Tariff (REFiT) Strategy is an implementation strategy based on a consultative process involving all key stakeholders. Accordingly, appreciation is extended to all stakeholders who took part in the Strategy formulation process These included the Policy Analysis and Coordination Division (PAC) of Cabinet Office, the Energy Regulation Board (ERB), the Rural Electrification Authority (REA) and ZESCO Limited.

Special thanks go to the United States Agency for International Development (USAID) and Southern Africa Trade Hub (SATH) for providing technical assistance and financial support to develop Zambia's REFiT Strategy.

Further, the participation of all institutions and individuals who contributed to the development of this Strategy is acknowledged.

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Brig.Gen. Emeldah Chola (Rtd) Permanent Secretary

MINISTRY OF ENERGY

WORKING DEFINITIONS

Clean Energy: Energy, as electricity or nuclear power, that does not pollute the atmosphere when used.

Cost reflective tariffs: Tariffs set to recover all the allowable costs of each regulated and licensed activity. 'Allowable costs' in this case means all operating costs reasonably incurred, all capital costs prudently invested, and a fair rate of return on used and useful utility assets.

Feed-in Tariffs: A payment made to households or businesses generating their own electricity through the use of methods that do not contribute to the depletion of natural resources, proportional to the amount of power generated.

Geothermal Energy: Energy available as heat emitted from within the earth's crust, usually in the form of hot water or steam. It can be exploited for electricity generation using dry steam or high enthalpy brine after flashing.

Grid: A system of high tension cables by which electrical power is distributed throughout a region.

Hydropower: Potential and kinetic energy of water converted into electricity in hydroelectric plants.

Implementation Agreement: An agreement that provides for direct contractual obligations and undertakings between the Government and the supplier of electricity or Project Company because the Government is not a party to the Power Purchase Agreement.

Independent Power Producer (IPP): A privately owned producer of electric power.

Kilowatt: Measurement of power meaning 1,000 watts.

Megawatt: Measurement of power meaning 1,000 Kilowatts.

Off-taker: The party to a PPA whose obligations is to purchase the capacity made available between the project company and the operator under which the operator operates and maintains the power plant.



Power Purchase Agreement (PPA): A contract between two parties, one of which produces or generates power for sale (the Seller/Producer) and one of which purchases power (the buyer/offtake). This is sometimes referred to the Off-taker Agreement.

Renewable Energy: Energy that is derived from natural process that are replenished constantly.

Solar Energy: Solar radiation exploited for hot water production and electricity generation.

Solid Biomass: Covers organic, non-fossil material of biological origin which may be used as fuel for heat production or electricity generation.

Tariff: Combination of charging parameters applied to recover measured quantities such as consumption and capacity costs, as well as unmeasured quantities such as service costs.

Tariff Structure: Contains all the components of price and the relationship to consumption and demand.

Wind Energy: Kinetic Energy of wind exploited for electricity generation in wind turbines.

ACRONYMS

EIA Environmental Impact Assessment

ERB Energy Regulation Board FDI Foreign Direct Investment

IEC International Electrotechnical Commission

IRP Integrated Resource Plan

MoE Ministry of Energy

NDP National Development Plan NEP National Energy Policy

PAC Policy Analysis and Coordination Division

PPA Power Purchase Agreement
REA Rural Electrification Authority
REFiT Renewable Energy Feed-in-Tariff

SADC Southern African Development Community

SNDP Sixth National Development Plan
SATH Southern African Trade Hub

USAID United States Agency for International Development

ZPPA Zambia Public Procurement Authority

1. INTRODUCTION

Zambia is endowed with a range of energy resources, particularly woodlands and forests, hydro, coal and renewable energy sources such as geothermal, wind and solar energy. Energy is critical to the development and diversification of the economy, because it plays a key role in facilitating economic activity in all sectors. Energy is a key driver of economic growth and as such the Zambian economy needs an ever increasing supply of energy to match the demands of industry in order to sustain economic growth, raise living standards and reduce poverty.

Zambia's energy sector is gradually moving towards a less vertically integrated electricity sector with a clear ambition to increase generation and involve the private sector in the construction of new facilities. The major energy sector reforms in Zambia occurred around the 1990s with the formulation of the National Energy Policy 1994, establishment of the Energy Regulation Board (ERB), abolishment of the ZESCO monopoly and allowing the participation of several private operators in the sector.

The overriding Zambian policy framework is created by the Vision 2030, which provides the basis for interface by all sectors and provides direction for short, medium and long term policies and plans. The Government's overall energy objectives (Vision 2030 and National Development Plans) are to improve delivery of energy services by increasing electricity generation capacity and electrification levels.

Zambia's electricity supply is predominantly based on hydropower. However, expansion and diversification of the existing available renewable energy resources is required as the country is in the short term facing a diminishing electricity reserve margin, and in the medium to long-term facing issues with energy supply security.

The country is confronted with increasing energy demand, resulting from demographic and socio-economic factors, at approximately 6 % per annum (150-200 MW). Zambia is powered by green, cost-effective renewable hydropower energy, and hydropower will likely continue to be the main energy generation source due to resource availability and low cost of generation. In addition, Zambia is rich in other renewable energy resources, such as geothermal, wind, biomass and solar, which in the short- to medium term, together with mini-hydro, can be added to the energy generation mix to cover around 5-10 % of generation capacity. The Government's overall energy objectives, in line with the National Energy Policy (NEP) 2008, Vision 2030 and National Development Plans, are to create conditions that will ensure the availability of adequate supply of energy from various sources, which

are dependable, at lowest economic, financial, social and environmental cost consistent with national development goals.

The NEP (2008) creates a general framework for the renewable energy sector to develop, but requires additional frameworks and strategies to impact specific developments of the energy sector, such as increased private sector involvement. A dedicated Strategy that focuses on the specific details of expansion and diversification of renewable energy uptake through private sector involvement and the use of Feed-in Tariffs, with a clear institutional framework and an appropriate and effective financial regime, shall aid the development and expansion of the renewable energy sub-sector in Zambia.

The objective of the REFiT Strategy is to harness the renewable energy sector's potential to drive economic growth and improve the quality of life for all Zambians. This will be achieved through the promotion of small-and medium-sized renewable energy projects of up to 20 MW, quick deployment of private investment for small- and medium-sized renewable energy projects and ensuring cost-effective tariffs through transparency and competition in the sector.

In this regard the REFiT Strategy is envisaged to expand the renewable energy deployment by creating a platform to remove barriers and provide effective processes for licensing and technology-based standardized Power Purchase Agreements (PPAs) in order to increase private sector involvement in power generation. The REFiT will therefore promote diversification of the power sector by adding a portfolio of small- and medium-sized renewable energy projects in the short term.

2. SITUATION ANALYSIS

Zambia's electricity supply is predominantly based on hydropower which accounts for more than 80% of the total installed capacity. Zambia's hydropower resource potential is estimated at over 6,000 MW and the installed capacity is about 2, 700 MW of which small- and medium-sized power generation accounts for less than 2% despite Zambia being rich in renewable energy resources, such as, biomass, solar, wind and geothermal.

As earlier indicated Zambia is confronted with an increasing energy demand, resulting from demographic and socio-economic factors, at approximately 6 %, or 150-200 MW, per annum. Further, the changes in the climatic conditions and weather patterns as evidenced in the late onset and intermittent rainfall pattern experienced during the rain seasons in the recent past referred to as the hydrological drought season have also contributed to the problem. Access to electricity in Zambia still remains very low. According to the Central Statistics Office (CSO) 2015 Living Conditions Monitoring Survey Report, rural access to electricity stands at 4.4% as compared with 67.3% in urban areas, while the national access rates stand at about 31%. The low electricity access rates could be attributed to growth in population and industrial activities that has not been matched with the rate of electricity connections. Therefore, government has a mammoth task of achieving the universal access to energy by the year 2030.

Expansion of the existing available renewable energy resources therefore becomes a requirement as Zambia is facing a diminishing electricity reserve margin.

As earlier alluded to, the country's energy sector is gradually moving towards a less monopolized electricity sub-sector with a clear ambition to increase generation and involve the private sector in the construction of new facilities. It has been deemed desirable to gradually diversify the renewable energy mix in relation to sector participants and renewable energy sources to improve energy security.

The NEP (2008) creates a general framework for the renewable energy sector to develop but requires additional frameworks and strategies to impact specific developments of the energy sector, such as increased private sector involvement. However, there is no dedicated Strategy that focuses on private sector involvement in renewable energy projects of up to 20MW and the use of Feed-in-Tariffs, with a clear institutional framework and an appropriate and effective financial regime.

Having a dedicated REFiT Strategy shall aid the development and expansion of the renewable energy sub-sector in Zambia. This is particularly important because small scale renewable energy will become an important element of the energy generation mix in Zambia. The REFiT approach will allow for alternative ownership and management models and will also provide an opportunity to empower local entrepreneurs and communities. The REFiT Strategy has the potential to transform the energy sector in profound and tangible ways.

Renewable energy resources in Zambia are under exploration; however, there has been proven resource availability as follows:

Table 1: Availability of Renewable Energy sources in Zambia

RENEWABLE ENERGY SOURCE/TECHNOLOGY	OPPORTUNITIES/USE	RESOURCE AVAILABILITY		
Solar	Thermal (water heating), Electricity (water pumping, lighting, refrigeration)	6-8 sunshine hours		
Wind	Electricity, Mechanical (water pumping)	Average 2.5m/s		
Micro-hydro	Small grids for electricity supply	Reasonably extensive		
Biomass (combustion and Gasification)	Electricity generation	Agro wastes Forest wastes Sawmill wastes		
Biomass (biomethanation)	Electricity generation Heating and cooking	Animal waste Municipal and Industrial waste Waste water		
Biomass	Ethanol for blending with gasoline to replace lead as	Sugarcane		
(extraction, processing for transport)	octane enhancer Biodiesel for stationary engines	Sweet sorghum Jatropha		

RENEWABLE ENERGY SOURCE/TECHNOLOGY	OPPORTUNITIES/USE	RESOURCE AVAILABILITY		
Biomass (for household energy)	Improved charcoal production Improved biomass stove	Sawmill wastes and indigenous trees from sustainable forest management		
Geothermal	Electricity generation	Hot springs		

Source: National Energy Policy, 2008

3. RATIONALE

Zambia experiences a need for sustained additional power generation in order to reduce the increasing demand-supply gap. In parallel, there is the need to streamline the decision-making process for approving new projects, encourage more actors in the sector as well as improve capacities to package and design bankable projects.

The NEP (2008) creates a general framework for the renewable energy subsector to develop in the short, medium and long term. However, investments in the renewable energy sub-sector from private investment have not taken place particularly for small- and- medium-sized projects of up to 20MW due to many bottle necks associated with the investment procedures and the non-cost reflective tariffs.

The Government has accorded priority to private sector involvement, but there are still a number of barriers that limit this involvement. These include:

- a. Inadequate policy framework and policy measures providing an effective Governmental framework for the objectives, principles, measures, mechanisms and scale for the uptake of private sector investments in the energy sector.
- b. The need for clear guidelines, rules and regulations for operationalization of private sector involvement. This includes guidelines for long-term contracts, payment guarantees, tariff calculations, grid connection procedures and costs, governmental priorities, tender procedures, etc.
- c. Non-cost reflective tariffs have contributed to the low uptake of private sector investments.

The REFiT Strategy will create a platform to remove barriers for increased private sector involvement in renewable energy power generation for small- and medium-sized projects of up to 20 MW. The short-term aim is to increase the national generation output through private sector generation investments in technologies that are able to participate at relative low tariff levels and combined with increased grid capacity through private micro-generation. The medium- to long-term aim is to contribute to a diversified energy mix in order to create increased energy security.

Specifically, at macro level, the REFiT mechanism has the potential to transform the energy sector in tangible ways, REFiT can facilitate increase in overall energy production, boost economic development and improve access to clean energy

while reducing the emission of greenhouse gases and other problems related to fossil fuel-based development.

Additionally, at a micro level, the REFiT mechanism can enhance energy security through the development of various power projects of up to 20MW in different locations of the country, especially the rural areas, thereby increasing the element of small scale renewable energy generation in the country's energy mix to about 5-10%. This will consequently reduce the collective impact of climate change on the energy sector.

4. VISION AND GUIDING PRINCIPLES

4.1 Vision

The REFiT Strategy is aligned to the National Vision 2030 for the energy sector:

"A developed Renewable Energy subsector for sustainable socioeconomic development".

4.2 Guiding Principles

The Guiding Principles for the REFiT Strategy are as follows:

a) Sustainable Renewable Energy Resources Development:

All renewable energy developments shall be environmentally sustainable and positively contribute to national economic growth and social development objectives, including poverty alleviation, equitable access to clean energy, gender equity and equality, and wealth creation.

b) Consultative approach:

All process under the REFiT mechanisms shall be undertaken in a participatory and consultative process with all relevant stakeholders.

c) Transparency and Accountability:

There shall be sector regulatory autonomy to ensure efficiency, transparency and accountability in regulatory operations.

5. MEASURES

5.1 Strategy Objective

The aim of this Strategy is to increase the national generation output through private sector investments in Renewable Energy technologies that are able to contribute to increased grid capacity through the development of small and medium scale projects of up to 20MW. This will ultimately contribute to a diversified energy mix in order to enhance energy security. The following are the specific measures and activities that will be undertaken to achieve a diversified energy mix;

5.2 Measures

- a) Providing a 3-year REFiT generation allocation of initially 200 MW, divided into 100 MW hydropower and 100 MW non-hydropower through:
 - i. Preparation and issuing of a rapid IRP allocation based on existing available data in relation to the first phase 200 MW REFiT allocation taking into consideration location, distribution network, existing and planned projects, etc;
 - **ii.** Preparation and issuing of a REFiT tariff for the REFiT allocation. The tariff shall be a differentiated tariff regime according to Solar, Hydro and Biomass technologies. The differentiated tariffs shall also be according to the capacity or size of the specific technology.
 - iii. For Solar PV, the procurement modality will be a reverse auction. The selection of projects will be based on price competition, with the bidders offering the lowest tariffs while fulfilling all conditions in the tender documentation to be selected. All bids must be lower than REFiT levels established by the Energy Regulation Board (The Regulator).
 - iv. Securing existing grid connection and grid utilization rules, including rights, responsibilities and pricing mechanisms that accommodate eligible generation plants under the REFiT and provide effective and timely grid access;
 - v. Preparation and issuing of standardized licenses, Implementation Agreements and PPAs for the REFiT scheme with the ZESCO (Public Power Utility Company) as the off-taker. Licenses and PPAs shall be technology-specific where necessary;
 - vi. Ensuring ZESCO has the rights to pass the REFiT power procurement costs through to the customers;



- vii. Preparation of a risk mitigation package in order to secure confidence in the off-taker as PPA counterpart;
- viii. Preparation and issuing of Governmental preferences for private sector participation, including preference for improved electricity access to social services such as schools and health centers; local community equity allocation and profit sharing; expanded rural electrification; and agricultural development such as electricity to farm blocks, irrigation and agro-processing; and
- ix. Implementation of the REFiT scheme for private sector participation. This includes preparation of competition criteria and Governmental preferences, and the management of the tendering process (program announcement, Terms of Reference, Expression of Interest, prequalification and issuance of licenses and PPA for prioritized projects).
- b) providing for a 3-year REFiT micro-generation allocation of initially 5 MW through:
 - i. An allocation of 5 MW to be reserved for micro-generation projects taking into consideration location, distribution network, etc. Rules and detailed eligibility criteria for the microgeneration window will be developed jointly by the Ministry responsible for energy, ZESCO and the Energy Regulation Board. It shall be assessed and agreed how a larger content can be achieved in the microgeneration window.
 - ii. Preparation and issuing of grid connection rules to adopt an openaccess micro-generation connection regime. All direct connection costs shall be borne by the owner of the micro-generation power plant, while ZESCO shall cover additional inputs and costs for net-metering readings, billing, etc.; and
 - iii. Preparation and issuing of a tariff for the micro-generation allocation. To make the micro-generation incentive administratively simple and effective, the micro-generation scheme for the first phase is based on energy savings corresponding to prevailing tariff levels (net-metering).

- c) To provide a platform for the second REFiT phase through:
 - i. Preparation and issuing of a comprehensive IRP before end of the 3-year period in relation to future generation allocations taking into consideration resource mapping, developments in generation technologies, location, distribution network, etc. Further allocations shall be linked to the issuance of the comprehensive IRP; and
 - ii. Based on the results of the M&E process, adjustment and issuing of revised tariff(s), grid connection and utilization rules, standardized licenses and PPAs, PPA payment guarantees, Government preferential procurement guidelines, and tender management processes.

6. IMPLEMENTATION FRAMEWORK

6.1 Institutional framework

The operation of the REFiT Strategy will be anchored on the National Energy Policy of 2008. As such the Strategy will guide the operation of the different institutions in the Energy Sector that are part of the Renewable Energy Sub Sector. In order to ensure unity of purpose, all levels of the Subsector will be involved in the implementation of the REFiT Strategy.

The Principal stakeholders for implementation of the Strategy are:

- The Ministry of Energy (MoE) as the national Ministry responsible for policy formulation and implementation for energy.
- The Energy Regulation Board (ERB) as the national independent energy sector regulator responsible for ensuring reasonable return on investments for operator/utilities, setting tariffs and monitoring market competition.
- ZESCO Limited as the state-owned public utility involved in generation, transmission, distribution and supply of electricity to end user.
- The Private Sector

The implementation of the Strategy will be as follows:

6.1.1 The Ministry of Energy

The Ministry of Energy (MoE) will be responsible for:

- Rapid IRP allocations. Rapid Integrated Resource Plan (IRP) allocations shall be prepared in close cooperation with ERB and ZESCO and issued by MoE as the basis for the first 3-year phase of the REFiT hydro, non-hydro and micro-generation allocations
- PPA risk mitigation. A risk mitigation package shall be developed if and when necessary in order to secure confidence in the off-taker as a credible PPA counterpart
- Governmental preferential guidelines. Preferential private sector involvement guidelines in line with the specific Strategy priorities listed in chapter 2 shall be prepared in close cooperation with all key stakeholders and issued for the hydro and non-hydro allocations before the tender process is initiated



• Tender rules and processes. REFIT tender rules and processes for private sector power generation shall be issued by MoE in close cooperation with ZPPA for the hydro and non-hydro allocations before the tender process is initiated. MoE shall administer the tender process.

6.1.2 The Energy Regulation Board (ERB)

The Energy Regulation Board (ERB) will be responsible for the following:

- Marginal avoided costs. The marginal avoided costs shall be calculated and issued based on the avoided costs of marginal energy supply at relevant voltage levels, medium sized hydro generation by ZESCO, at a national average location and linked to incremental tariff increased announced by ERB.
- REFiT tariff. A REFiT tariff shall be issued by ERB for the REFiT hydropower generation allocations based on the calculated avoided costs of marginal energy supply while the non-hydro tariffs will be based on a reverse auctioning competitive bidding.
- Grid rules alignment. ERB shall ensure that existing Grid Rules are aligned to and accommodate the REFiT Strategy for the hydro, non-hydro and micro-generation allocations.
- Standardized PPA and licenses. Standardized PPAs and licenses shall be prepared and issued by ERB with ZESCO as the off-taker for the hydro, non-hydro and micro-generation allocations. The PPA and license templates shall be developed and proposed by ZESCO for approval by FRB
- Micro-generation connection guidelines. The micro-generation connection guidelines shall be developed and proposed by ZESCO for approval by ERB.

6.1.3 ZESCO

ZESCO shall provide active participation in development and formulation
of secondary mechanisms outlined above and effective and timely
execution of roles and responsibilities as laid out in the secondary
mechanisms issued by MoE and ERB.

6.2 Legal Framework

The Strategy will be implemented within the existing legal framework through the various Acts of Parliament which govern the resource management and development for the energy sector. These pieces of legislation include among others; the Constitution of Zambia (Amendment Act No. 2 of 2016), The Electricity Act No. 15 of 1995, the Energy Regulation Act No. 23 of 2003, the Rural Electrification Act No. 20 of 2003 and the Zambia Public Procurement Act No. 15 of 2011. In the process of implementation, any norms, practices, or legislation that might inhibit the successful implementation of the Strategy will be reviewed and/or revised accordingly.

6.3 Resource Mobilization and Financing

In order to implement the measures proposed in the Strategy, financial resources will be required. Funding for the implementation of the Strategy will be secured from the following sources:

- a) Government's national budget;
- b) Cooperating Partners;
- c) Private sector; and
- d) Any other alternative funding sources.

6.4 Monitoring and Evaluation

To effectively monitor and evaluate the implementation of the REFiT Strategy, a comprehensive Monitoring and Evaluation Framework will be developed by the Ministry of Energy (MoE). The framework will emphasize on regular progress monitoring and periodic in-depth evaluation to ensure that expected outputs, outcomes and impacts are achieved based on the agreed upon Key Performance Indicators.

Matrix on Objective, Measures, Actions, Indicators and Timelines 6.4.1

Time Frame	2019	2017	2017	2017		2017		2017			
Action	i. Preparation and issuing of a rapid IRP allocation based on existing available data	ii. Preparation and issuing of a REFiT tariff for the REFiT allocation	iii. Signing of grid connection and grid utilization rules	iv. Preparation and issuing of standard-ized licenses, Implementation Agree-	ments and PPAs for the REFiT scheme with ZESCO as the off-taker.	v. Ensuring ZESCO has the rights to pass	the KEFTI power procurement costs through to the customers;	vi. Preparation of a risk mitigation pack-	the off-taker as PPA counterpart;	vii. Preparation and issuing of Govern-	ntental preferences for private sector participation
Measure	To provide a 3-year REFiT generation allocation of initially 200 MW, divided	into 100 MW hydropower and 100 MW non-	nyaropower								
Objective	To increase the national generation output through private sector investments	in Renewable Energy technologies that are able	to contribute to increased grid capacity through private micro-aeneration								
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