



Zambia Renewable Feed-in Tariff (REFIT) Program

Renewable Feed-in Tariff Rules

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List of Abbreviations

DCF	Discounted Cash Flow
Electricity Act	Electricity Act, Cap 436
Energy Regulatory Act	Energy Regulatory Act, Cap
ERB	Energy Regulation Board of Zambia
FM	Force Majeure
Grid Code	Zambia Transmission Grid Code
GRZ	Government of the Republic of Zambia
IPP	Independent Power Producer
kWh	kilowatt-hour
LRMC	Long Run Marginal Cost
PPA	Power Purchase Agreement
RE	Renewable Energy
RE Project	Renewable Energy Project
REFIT	Renewable Energy Feed-in Tariff
SRMC	Short run marginal cost
USD	United States Dollar
ZESCO	Zambia Electricity Supply Company
ZMK	Zambian Kwacha

1. Policy Context

The overall aim of the Renewable Energy Feed-in Tariff (REFIT) program is to encourage and support greater private sector participation in power generation from renewable energy sources, through the establishment of an appropriate policy and regulatory framework.

The approach in this document is in line with the REFIT Policy of 2015. Renewable energy in the context of REFIT policy is defined as electricity which can be generated from renewable resources such as water power, wind power, solar energy, geothermal energy and biomass generation.

The REFIT shall apply to small-scale renewable energy systems, as set out in Schedule 1 hereto, as amended from time to time in terms of the REFIT Policy, 2015.

The purpose of the REFIT Rules is to provide further guidance on the operationalization of Zambia's REFIT program.

2. Principles of Zambia's REFIT Program

REFITs are internationally recognized mechanisms used to promote and increase the amount of electricity generated from renewable sources, by essentially providing a defined tariff for a specified period of time. The key elements of the Zambia REFIT Program are:

- (a) Facilitating the deployment of Renewable Energy (RE) projects through streamlined processes and procedures;
- (b) Integration of administrative and application processes with existing regulatory processes to avoid duplication and reduce delays in implementation;
- (c) A dynamic mechanism that reflects market, economic and political developments;
- (d) Guaranteed purchase price for a fixed duration;
- (e) Access to the transmission grid for qualifying RE generators and an obligation on the designated off-taker to purchase the power generated;
- (f) REFIT program sustainability through automatic cost-pass through to electricity consumers;
- (g) Establishment of maximum periodic capacity allocations for specified technologies in line with the REFIT policy;
- (h) Qualifying RE generators required to accept a standardized Power Purchase Agreement;

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- (i) Zambia's REFIT program only applies to projects within the borders of the Government of the Republic of Zambia (GRZ);
- (j) RE projects that do not qualify under the REFIT program may be developed through negotiation with the appropriate authorities, subject to applicable policies and legislation. However, this process falls outside the scope of this document.

3. Governance Structures

3.1. Government

- (a) The GRZ is the custodian of the REFIT program and develops policy for the procurement of RE within the broader context of integrated resource planning for the electricity sector.
- (b) The Government's roles and responsibilities under the REFIT include:
 - (i) Developing a transparent and efficient REFIT procurement program;
 - (ii) Procuring (or causing to be procured) RE generation projects for participation under REFIT;
 - (iii) Establishment of a committee to coordinate, direct and align the efforts of various government institutions in support of the REFIT program;
 - (iv) Mandating ZESCO as the designated Off-Taker of power from procured RE projects;
 - (v) Developing appropriate support mechanisms to facilitate RE Independent Power Producers (IPPs) for individual projects, such as letters of comfort, Government Guarantees etc. as appropriate;
 - (vi) Entering into implementation agreements with eligible RE project developers, as necessary;
 - (vii) Entering into direct agreements with lenders, as necessary;
 - (viii) Revising Zambia's REFIT policy from time to time.

3.2. Energy Regulation Board

- (a) The Energy Regulation Board (ERB), established under the provisions of the Energy Regulation Act, Chapter 436 of the laws of Zambia will assist the REFIT program by creating an enabling environment through appropriate regulatory instruments.
- (b) The ERB's roles and responsibilities under the REFIT include:

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- (i) Establish and review the tariff structure for RE technologies;
- (ii) Manage, administer, and review REFIT from time to time;
- (iii) Develop and review the REFIT guidelines and rules;
- (iv) Monitor, report on and review the implementation of the REFIT program;
- (v) Develop and enforce performance standards, quality standards and codes of conduct for the generation, transmission and distribution of electricity;
- (vi) Within its mandate prescribe and collect license fees and charges;
- (vii) Establish and review licensing procedures, receive and process applications for generation licenses, issue and periodically review generation licenses;
- (viii) Supervise licensed RE generators and verify electricity production from the licensed RE generators;
- (ix) Develop, manage and review appropriate regulations for grid connection of RE projects in accordance with Zambian Grid Code requirements;
- (x) Mediate disputes, in terms of its mandate, between generators, transmitters, distributors and consumers;

3.3. ZESCO

- (a) Under its mandate as off-taker, ZESCO Limited (ZESCO) will sign standardized Power Purchase Agreements (PPAs) with qualifying RE generators selected under the REFIT Program procurement process.
- (b) Under the PPA, ZESCO shall be obliged to purchase power generated under the REFIT Program from licensed RE generators subject to fulfilment of all necessary license conditions.
- (c) ZESCO shall be obliged to connect licensed renewable energy electricity generators to the transmission or distribution network in accordance with agreed cost estimates, timelines and grid connection agreement.

4. REFIT Program Technology Limits

The REFIT program technology limits shall be set in accordance with the REFIT policy.

- (a) Eligible RE technologies are listed in in Appendix 1 (Eligible Technologies).

- (b) The maximum size (ceiling values in MW) of the REFIT program is shown in Appendix 2 (Procurement Limits).

5. **Tariff Regulation and Cost Recovery**

The ERB shall set the REFIT, in accordance with the REFIT policy, and as described in Appendix 3. The key attributes of the REFIT are:

(a) **REFIT Structure**

The REFIT structure for Zambia is set out below:

- (i) **Tariff Component:** A single-part energy-only tariff (kWh)
- (ii) **Currency:** United States Dollar (USD)
- (iii) **Base REFIT:** USD/kWh with reference to 1 July 2015
- (iv) **Indexation:** The full Base REFIT shall be adjusted annually from 1 July 2016 to allow for changes in the United States Consumer Price Inflation Index. :

(b) **REFIT Level**

The applicable REFIT levels are shown in Appendix 4 (REFIT):

(c) **Cost Pass Through**

The ERB's current tariff methodology titled *Electricity Tariff Determination Guidelines for Retail Customers (June 2015)*, provides for full cost pass through of the PPA purchase costs. The relevant sections from this guidelines states:

6.3.1 Allowable operating expenses relates to all expenditure just and reasonable incurred wholly and exclusively for generation, transmission, distribution and supply of electricity. The costs include:

b) Electricity purchases (from Independent Power Producers (IPP)s, Bilateral Agreements and Southern Africa Power Pool (SAPP)).

The ERB shall allow and include the PPA purchase costs from the licensed REFIT generators in the revenue requirement of ZESCO as contemplated in the above sections.

(d) **Cost Recovery of RE generators**

RE generators under the REFIT program are allowed to recover costs through a range of options, including:

- (i) The REFIT;
- (ii) Green electricity sales;

- (iii) Donor support;
- (iv) International climate change funds; and
- (v) Carbon finance.

6. Power Off-Take Arrangements

- (a) ZESCO shall be the designated buyer of all the power delivered under the Zambia REFIT program.
- (b) The details of the off-take arrangement shall be set out in a standardized, technology-neutral PPA which shall be based on the following high level principles:
 - (i) Guaranteed purchases of all energy delivered under the PPA;
 - (ii) A PPA term of at least 20 years from commercial operation date;
 - (iii) Clearly defined tariff for the term of the PPA.
- (c) The ERB shall approve each PPA in accordance with the Energy Act.
- (d) The successful RE Project developer and ZESCO shall enter into a PPA

7. Grid Connection

7.1. General Conditions

- (a) All projects implemented under the REFIT shall be obliged to comply with all relevant technical, legal and regulatory requirements of the Republic of Zambia.
- (b) RE Generators shall be obliged to abide by national standards for connection, operations and reporting as outlined in the Zambia Grid Code

7.2. Connection Obligations and Arrangements

- (a) The eligible RE Project shall apply for a connection from ZESCO in accordance with the Grid Connection Guidelines;
- (b) ZESCO will process the grid connection application in accordance with the Grid Connection Guideline which includes cost estimates for conducting stability studies as well as for the design, construction and commissioning of all connection infrastructure.
- (c) The REFIT values defined in Appendix 4 (REFIT) include a standardized allowance for interconnection costs. The costs of interconnection, including the

costs of construction, upgrading of transmission/distribution lines, substations, and associated equipment, are to be borne by the developer.

- (d) The interconnection costs will be paid by the RE licensee upfront.
- (e) Subject to prior arrangements with ZESCO, the RE Project may construct (or caused to be constructed) the infrastructure to facilitate interconnection and meet all technical requirements.
- (f) The RE Project and ZESCO shall enter into a Grid Connection Agreement that will govern the technical, commercial, regulatory and legal aspects of the RE Project's connection to the grid.
- (g) Subject to the costs and other conditions being met by the RE Projects as set out in the Connection Agreement, ZESCO shall connect plants generating electricity from RE sources.

7.3. Grid Code Compliance

- (a) RE projects that connect to the national grid shall comply with the requirements set out in *The Electricity (Grid Code) Regulations, 2013* (the Zambia Grid Code).

8. Application and Project Selection Process

All REFIT projects will be procured through a competitive bidding process under the auspices of the Ministry of Mines, Energy and Water Development (and its designated assignees). The rules of the bidding process will determine on what basis projects are selected and what the project selection criteria are.

- (a) Application for a REFIT license will be processed as a normal generation license and normal license applications fees will apply.
- (b) Licenses for projects under the REFIT will be awarded up to the maximum defined in Schedule 1 on a first come first served basis.
- (c) In addition to existing licensing procedures, eligible RE Projects will be required to accept the terms of the standardized Power Purchase Agreement and provide proof thereof to the ERB.

9. Generation Licensing Arrangements

- (a) Any person who intends to establish a renewable energy power project under the REFIT shall be obliged to fulfill all the requirements and obligations for licensing according to the Electricity Act, Cap 433 and the Energy Regulation Act, Cap 436 (the "Acts").

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- (b) The licensing procedure for RE projects under the REFIT shall be done according to the Acts.
- (c) Over and above the current requirements, the prescribed forms in the Acts shall be modified to include –
 - (i) The type of license required;
 - (ii) Contribution of the project to grid stabilization and reduction in network losses;
 - (iii) Acceptance of the standardized Power Purchase Agreement;
 - (iv) Inclusion of the Grid Connection Agreement;
 - (v) An indication of the location and technical specifications of the interconnection point with the grid;
 - (vi) Technical and financial requirements for network integration.
- (d) The REFIT is awarded at the time of the award of license. Should the license expire, the tariff shall also expire. Any re-application or extension of the license will require that the prevailing tariff at the time of re-application or extension shall apply.
- (e) Qualified RE generators shall be obliged to pay license fees to the ERB as specified the Electricity (License Fees) Regulations.

10. Oversight, Monitoring, Reporting and Review

10.1. Energy Regulatory Board

- (a) ERB shall be responsible for overall monitoring and evaluation of the REFIT.
- (b) An Annual Monitoring review shall take place at the end of each financial year and shall comprise the evaluation of uptake in terms of technology, installed capacity and location
- (c) A Program Review shall take place at least every three years and shall comprise:
 - (i) Comprehensive assessment of the tariff model including key assumptions;
 - (ii) Assessment of the list of technologies to either add or remove technologies;
 - (iii) Review of capacity limits and adjustment if required;

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- (iv) Consultation with key stakeholders.
- (d) ERB shall be obliged to gather and maintain a database and report annually on the following:
 - (i) Energy produced and energy purchased under the REFIT from each specific RE technology;
 - (ii) Financial and economic impacts of the REFIT to the ESI;
 - (iii) A review and update on the introduction of possible additional qualifying RE technologies under the REFIT program;
 - (iv) Progress on the implementation of the REFIT;
 - (v) Actual generation costs.
- (e) ERB shall act as Secretariat for an interdepartmental steering committee, including, but not be limited to ERB, ZESCO, the Ministry of Finance, the Ministry of Energy and Water Development. The aim of the steering committee will be to –
 - (i) Act as oversight and implementation committee for the REFIT Program procurement processes;
 - (ii) Identify and mitigate bottlenecks to RE Projects under the REFIT Program.

10.2. ZESCO

- (a) ZESCO shall be obliged to monitor, verify and report to ERB on an annual basis:
 - (i) The total number of licensed and operational RE Generators by technology and installed capacity;
 - (ii) Electricity production by the licensed RE Generators;
 - (iii) The cost of energy purchased under the REFIT and all additional costs for implementation of the REFIT;
 - (iv) The performance of the licensed generators/units against parameters registered;
 - (v) Compliance by licensed RE Generators with the Zambia Grid Code;

- (vi) The RE Generators shall be obliged to provide such information to ZESCO acting as system operator as is necessary to facilitate its compliance with the Acts, the Grid Code and these rules.

10.3. Renewable Energy Generators

- (a) RE Generators shall be required to report to ERB:
 - (i) Total up-front and on-going capital investment;
 - (ii) Generation performance including net maximum capacity generation and the quantity of RE generated and fed on to the grid under the REFIT;
 - (iii) Operation and maintenance costs;
 - (iv) Fuel costs (if applicable).
- (b) Additional generation on existing sites shall be monitored and reported on separately from existing generation, where applicable.

Appendices

Appendix 1 (Eligible Technologies)

In accordance with the REFIT policy (2015) the eligible RE technologies are listed below:

- (c) Wind
- (d) Solar
- (e) Geothermal
- (f) Hydro
- (g) Biomass

Appendix 2 (Procurement Limits)

In accordance with the REFIT policy (2015) the procurement limits per technology (in MW) are shown below:

- (h) 100 MW for hydro (Maximum of 20MW per project)
- (i) 50 MW for all technologies other than hydro (Maximum of 20MW per project)
- (j) 10 MW for micro generation.

Appendix 3 (REFIT Methodology)

In order to develop a balanced REFIT, various methodologies and options were considered. The different approaches may broadly be categorized into a) Cost based REFIT, and b) Value based REFIT. Below is a brief description of the two approaches and how they have been deployed to determine an appropriate REFIT for ZAMBIA

(k) Cost Based Approach

The cost based approach is based on the development of a technology specific REFIT. The first step is to estimate the tariff based on the cost of installing, operating and maintaining a RE power system which would feed in to the ZESCO grid. A Discounted Cash Flow (DCF) model is used to estimate tariffs based on assumed rates of return to investors. Data for the DCF model is gathered from various local sources to reflect the cost of installing and operating a system in Zambia. Costs are differentiated by RE technology and by size range based on availability of data. The cost of financing projects is based on information from financial institutions and project developers. The accounting and taxation practices prevalent in Zambia is used to estimate free cash flows.

(I) Value Based Approach

In this approach the value of electricity from a RE resource is essentially determined or set by ZESCO's avoided cost of power supply. Ideally ZESCO's avoided cost should be based on the utility's Long Run Marginal Cost (LRMC). In case the LRMC is not available, ZESCO's short run marginal cost (SRMC), or avoided cost of production may be used as a proxy of the value of electricity to ZESCO. Simplistically, the cost of the most expensive hourly plant on the ZESCO system which operates at the margin (peak load) may be assumed to be the SRMC.

The REFIT for Zambia is informed by the outcome of the above approaches and is set by the ERB after consultation with ZESCO, the Government of Zambia, and other relevant stakeholders.

Appendix 4 (REFIT)

REFIT levels as approved and published by the ERB

Solar PV Plant Size Range	Benchmark Tariff¹ (U.S. ¢/kWh)
500 kW but less than 1 MW	17.82
1 MW but less than 5 MW	16.76
5 MW but less than 10 MW	15.74
10 MW but less than or equal to 20 MW	14.25

¹ Note that the tariffs are benchmark tariffs which will allow for reverse auction or price discovery below the benchmark tariffs.

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Small Hydropower Size Range	Benchmark Tariff (U.S. ¢/kWh)
500 kW to 1 MW	13.98
1+ MW to 10 MW	9.53
10+ MW to 20 MW	8.05

Note these are the upper caps for the Small Hydro power plants