
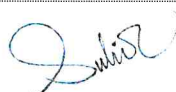

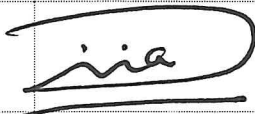





**UGANDA RENEWABLE ENERGY FEED-IN TARIFF (REFIT)
GUIDELINES
PHASE 5.0
Revised April 2021**

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1 Introduction

- 1.1 These Guidelines are meant to provide clarity and guidance to Project Developers, Investors, and key Institutional Stakeholders, on the key components and operational structure of the Renewable Energy Feed-in Tariff (REFIT).
- 1.2 Under the Renewable Energy Policy (2007), a REFIT was initially established in Uganda, which ran from 2007 to 2009. This is referred to from hereon as REFIT Phase 1.
- 1.3 Due to limited uptake by Project Developers, the REFIT was reviewed in 2010 and a new Tariff was developed based on updated Levelized costs of production, accompanied by these Guidelines. This was further revised in 2012 in preparation for the GET FiT Program. This is referred to from hereon as the REFIT Phase 2.
- 1.4 In 2016, a review of the REFIT Phase 2 was conducted. This resulted in the REFIT Phase 3 Guidelines.
- 1.5 In line with the Authority's Decision in 2012 to continuously review and update the REFIT at least after every Two (2) Years, a review of the REFIT Phase 3 was conducted and approved by the Authority in July 2019 resulting in the REFIT Phase 4 Guidelines.
- 1.6 Following the review of the REFIT Phase 4, the Authority in April 2021 Considered and Approved Feed-in Tariffs for a further Two (2) Years, thus leading to REFIT Phase 5.

2 Objective and Key Principles of the REFIT

Policy Context

- 2.1 The overall aim of the REFIT is to encourage and support greater Private Sector participation in Power Generation from Renewable Energy Technologies, through the establishment of an Appropriate Regulatory Framework.
- 2.2 This is in line with the Renewable Energy Policy (2007), whereby the Government's Policy Vision for Renewable Energy is ***"To make modern Renewable Energy a substantial part of the National Energy Consumption."***
- 2.3 The Renewable Energy Policy (2007) defines modern Renewable Energy as "Renewable Energy Resources that are transformed into Modern Energy services such as Electricity, which can be generated from Solar Energy, Wind Power, Water Power, Geothermal Energy, and Bagasse Cogeneration".

In addition, it refers to Clean Fuels derived from Renewable Energy resources such as Biogas, Ethanol, Methanol, Hydrogen, or Solar water heating as well as Biomass utilized in efficient Biomass Technologies, including improved charcoal stoves and firewood stoves.
- 2.4 Renewable Energy in the context of the REFIT is defined as "Electricity which can be generated from energy resources such as Water Power, Wind Power, Solar, Geothermal, Biogas, Landfill Gas Combustion, and Biomass Cogeneration". A full definition of Renewable Energy and the relevant Technologies is provided in Appendix 3.
- 2.5 The REFIT shall apply to Small-Scale Renewable Energy Systems of prescribed priority Technologies, up to a Maximum Installed Project Capacity of 20 (Twenty) MW, and greater than 0.5 MW, as defined by the Electricity Act, 1999.

Benefits of Feed-in Tariff

- 2.6 A Feed-in Tariff (FIT) is an Internationally recognized Regulatory Mechanism used to promote and increase the amount of Electricity Generated from Renewable Sources, by providing a

fixed Tariff based on the Levelized cost of production for a guaranteed time. Feed-in Tariffs have numerous advantages and benefits which include:

- (i) **Improved Energy Security** – Fuel is Renewable, Accessible, and “Indigenous”, enhancing National Security.
- (ii) **Reduced Environmental Impacts** – Direct Environmental impacts as well as externalities associated with conventional Electricity Production, such as water and air pollution, land-use change, and biodiversity loss are significantly reduced. Electricity Generation from Renewables also significantly reduces Greenhouse Emissions.
- (iii) **Economic Growth and Stimulation** – FITs stimulate the creation of “Green” Jobs, promote a competitive manufacturing industry, and can allow for revenues to be kept within a country. Additionally, FITs can lead to a decrease in Electricity Tariffs in the long term.
- (iv) **Diversified Electricity Supply Mix** – FITs can promote the production of Electricity from a diversified set of Technologies. A Technology-Specific approach to the establishment of Tariffs allows for the development and deployment of a wide range of Renewable Energy Technologies.
- (v) **Investment Security for Developers** - The penetration of Renewable Energy into the market largely hinges on investment security. With a FIT, the risk premium required by investors can be minimized by the high level of price security in the system. The Tariffs provided are high enough to cover investment costs and provide a reasonable Rate of Return. The long-term certainty provided also stimulates investment in relevant Technologies, Training, and Building Capacity.
- (vi) **Industry Competition** - A FIT encourages competition with the Tariff gradually reducing as the industry matures. In the long-term, the establishment of a Renewables-Based Electricity Industry drives down the cost of Power Generation from Renewable Energy, due to learning effects and the development of institutional expertise. This increases the competitiveness of Renewables against Conventional Technologies whilst driving down costs for consumers.

- (vii) **Reduced Transaction Costs** - A FIT mechanism is characterized by low (to medium) administrative and transaction costs, especially when compared to a bidding process. The costs of the mechanism to society are also low and result in several ancillary benefits to the Electricity Supply Industry, Society, and the Economy.

Key Principles of Feed-in Tariffs

2.7 The key principles of the Ugandan REFIT include:

- (i) A dynamic mechanism that reflects the market, economic, and political developments;
- (ii) Integration of administrative and application processes with existing Regulatory Processes to avoid duplication and reduce delays in implementation;
- (iii) The guaranteed purchase price for a fixed duration and a Stepped Tariff for different Priority Technologies, ensuring an appropriate Return on Investment for Developers, while at the same time limiting and moderating producer surplus in Tariff setting, to prevent excessive returns for Developers which could impact negatively on electricity prices;
- (iv) A gradual/annual Tariff reduction for new projects as a result of learning effects and cost reduction (known as Tariff degression);
- (v) Guaranteed access to the licensed Transmission and Distribution grids for qualifying Renewable Energy generators and an obligation on the System Operator to purchase and discharge the power generated;
- (vi) Burden sharing of the additional cost (or a portion of this) throughout Electricity Consumers and from International Donor Organisations;
- (vii) Qualifying Renewable Energy Generators will accept a Standardised Power Purchase Agreement;
- (viii) Application of the REFIT to only projects within the borders of Uganda; and,
- (ix) The REFIT is aimed at fast-tracking multiple Priority Renewable Energy Projects and reducing Tariffs for new

projects on an annual basis within the limits of the Maximum Installed Project Capacity. Renewable Energy Projects above the Maximum Installed Project Capacity can be developed through the negotiation of Tariffs and Power Purchase Agreements (PPAs), on a case by case basis, with either the System Operator.

2.8 The additional Power Generation Costs resulting from the REFIT may be covered through the following sources:

- (i) Burden sharing by Electricity Consumers;
- (ii) Green Electricity Sales;
- (iii) Donor Support;
- (iv) International Climate Change Funds; and,
- (v) Carbon Finance.

3 Governance Structure

Electricity Regulatory Authority (ERA)

- 3.1 The REFIT will be managed and implemented by ERA as part of its Mandate under the Electricity Act of 1999.
- 3.2 ERA's roles and responsibilities under the REFIT include to:
- (i) Establish and Review the Tariff Structure for priority Renewable Energy Technologies;
 - (ii) Manage and Administer the Feed-in Tariff;
 - (iii) Develop and Review the REFIT Guidelines;
 - (iv) Monitor, Report, and Review the REFIT as outlined in Section 9 of these Guidelines;
 - (v) Develop and enforce Performance Standards, Quality Standards and Codes of Conduct for the Generation, Transmission, and Distribution of Electricity;
 - (vi) Prescribe and Collect Licence Fees;
 - (vii) Establish and review Licensing Procedures, Receive and Process Applications for Generation Licences, Issue and Renew Generation Licences;
 - (viii) Supervise Licensed Renewable Energy Generators and verify Electricity Production from the Licensed Renewable Energy Power Generators;
 - (ix) Develop, Manage and Review appropriate Regulations for Grid Connection and wheeling of Renewable Energy;
 - (x) Establish and Review Technology-Specific Capacity limits to prevent oversubscription of the REFIT;
 - (xi) Review and update the REFIT Tariff Model in line with the monitoring procedures defined in Section 9 of these Guidelines, including avoided costs of the Grid, Levelized cost of Renewable Energy Technologies, and the Renewable Energy Scenarios;
 - (xii) Mediate disputes between Generators, the Transmission Company, Distributors and Consumers of Electricity;

- (xiii) Establish and act as the Secretariat for the Inter-Agency REFIT Steering Committee to support the implementation of the REFIT.

System Operator

- 3.3 In consultation with ERA, the System Operator shall publish the REFIT Tariff for Priority Technologies as approved by the Electricity Regulatory Authority.
- 3.4 Under its Mandate as Single Buyer, the System Operator will issue and sign standardized Power Purchase Agreements (PPAs) with qualifying Renewable Energy Generators.
- 3.5 The System Operator shall be obliged to connect Licensed Renewable Energy Electricity Plants onto the Grid.
- 3.6 The System Operator shall be obliged to Transmit purchased Electricity from the Renewable Energy Electricity Generators Licensed under the REFIT.

Distribution Licence Holders

- 3.7 Holders of valid Distribution Licences shall be obliged to provide access and connect Licensed Embedded Renewable Energy Electricity Generation Plants to the Grid in their areas of operation.

4 Qualifying Renewable Energy Generators

- 4.1 Qualifying Renewable Energy Generators shall be defined as:
- (i) Priority Technologies as set out in Appendix 1. Additional Technologies can be added in line with the REFIT Review Process.
 - (ii) Projects greater than 0.5 MW Installed Capacity, in line with the Electricity Act, 1999.
 - (iii) Projects up to 20 MW Installed Capacity, in line with the Electricity Act, 1999. Projects with an Installed Capacity greater than 20 MW will be required to negotiate a Tariff and PPA with the System Operator, on a Case-By-Case Basis.
 - (iv) Plants increasing additional capacity resulting from project modernization, repowering, and expansion of existing sites, but excluding existing Generation Capacity. Additional Generation Capacity must be ring-fenced.
 - (v) Projects connected to the National Grid. Off-grid projects may be included in future developments of the REFIT, although this would require close consultation and collaboration with the Rural Electrification Agency to develop the Technical and operational modalities. In particular, this will require the establishment of a mechanism for the monitoring and sale of power to the System Operator as the Single Buyer.
 - (vi) Being located within the territory of the Republic of Uganda.
- 4.2 To avoid projects larger than 20 MW Installed Capacity splitting to take advantage of the REFIT, all projects must have a distinct Legal Entity. All leases, consents, and licences related to the project must be associated with this Legal Entity and cannot be shared with other projects submitted under the REFIT.
- 4.3 Priority Technologies are listed in Appendix 1.
- In this revision of the Guidelines, the REFIT will cover Hydro, Bagasse, and Cogeneration Projects only. A Tariff Ceiling Price is provided for other Technologies as indicated in Table A3 of Appendix 1.

4.4 Other Technologies

For other Renewable Energy Technologies not included in these REFIT Guidelines, approval of any potential projects will be considered by ERA on their merit.

5 Basis for the Determination of the Feed-in Tariff

5.1 The Tariff for each Priority Technology is determined using a US\$/kWh Levelized cost approach, based on the Electricity Generation Costs from the Renewable Energy Sources. This is aimed at providing to the Special Purpose Vehicle, an after-tax internal rate of return to equity holders equal to an assumed cost of equity capital, to provide sufficiently high Tariffs on the one hand and to avoid windfall profits on the other hand. The key inputs are based on general investment assumptions and specific assumptions for each of the Priority Technologies that influence the Power Generation costs. These include:

- (i) Investment costs for the Plant (including material and capital costs);
- (ii) Grid Connection Costs;
- (iii) Operation and Maintenance (O&M) Costs;
- (iv) Fuel Costs (in the case of Biogas and Biomass);
- (v) Interest Rates for the Invested Capital; and,
- (vi) Profit Margins for the investors.

5.2 The Tariffs shall be set according to the year in which the Licence is issued; and are provided in Appendix 1.

5.3 The Tariffs shall be adjusted for inflation using the following Tariff Adjustment Formula:

$$FIT_y = [FIT_B * (1 - w)] + \left[FIT_B * \frac{PPI_y}{PPI_B} * w \right]$$

Where:-

FIT_y Is the Applicable Feed-in Tariff in year y.

FIT_B Is the Applicable Feed-in Tariff in the year when the Commercial Operations Date is achieved.

PPI_y Is the Core Producer Price Index for the United States as published by the Bureau of Labour Statistics or its replacement,

applicable to the calendar year (i.e. year y) under consideration and shall be the index value for November of the preceding year (i.e. November of year y-1).

PPI_B Is the Core Producer Price Index for the United States as published by the Bureau of Labour Statistics or its replacement, for the month in which Commercial Operations Date was achieved.

W Is the share/weight of Operation and Maintenance costs in the applicable Feed-in-Tariff in any given year 'y' or as may be determined by the Authority.

5.4 The Electricity Regulatory Authority reserves the Right to develop an optional phased Tariff Structure, allowing a marginal increase during the early years (e.g. years 1-8) and a marginal reduction during the later years, although retaining the same overall present value. This is aimed at supporting Renewable Energy Generators in financing investments and debt servicing.

6 Technical Regulation

- 6.1 All Projects implemented under the REFIT shall be obliged to comply with all the relevant Technical, Legal, and Regulatory Requirements of the Republic of Uganda.
- 6.2 All Renewable Energy Power Generators shall be obliged to abide by National Standards for Connection, Operations, and reporting as outlined in the Electricity (Primary Grid Code) Regulations of Uganda, 2003, and all amendments thereafter.
- 6.3 The System Operator and Distribution Licence Holders, respectively, shall be obliged to grant access and connection to the Grid to the Renewable Energy Power Generators licensed under the REFIT. For Distribution Licence holders for Networks not forming part of the National Grid, access and connection will be subject to the proposed supply forming part of existing and future power demand requirements.
- 6.4 The System Operator shall dispatch Plants in consideration of the conditions in the respective Power Purchase Agreements and the Merit Order Dispatch Regime.
- 6.5 The Renewable Energy Power Generators shall be responsible for all costs for interconnecting the Power Plant to the Grid, at the appropriate voltage level if the Power Plant is located within a 5km radius from the Grid. If the Renewable Energy project is located outside the 5km radius, the costs for interconnecting the Power Plant to the Grid, at voltages above 33kV shall be the responsibility of the Off-taker/System Operator, the Uganda Electricity Transmission Company Limited.
- 6.6 For voltages at 33kV, the costs for interconnecting the Power Plant to the Grid shall be borne by the Rural Electrification Agency in consultation with the System Operator and the Licensed Distributor in the area.

7 Application and Project Selection Process

- 7.1 All Projects coming into the Industry will be subject to Section 29 of the Electricity Act, 1999.
- 7.2 Applications for the REFIT will be processed in conjunction with the Standard Process of applying for Licences for the Generation of Electricity.
- 7.3 A Performance Bond of US\$ 5,000 (Five Thousand United States Dollars) per MW of Installed Capacity shall be posted to secure the scheduled Construction Start Date.
- 7.4 Upon achievement of the scheduled Construction Start Date in 7.3 above, the Performance Bond amount shall be reduced to US\$ 2,500 (Two Thousand Five Hundred United States Dollars) to secure the scheduled Commercial Operations Date (COD). This Performance Bond shall be refunded upon achievement of COD. Failure to achieve COD within the specified Licence conditions will result in loss of the Performance Bond.
- 7.5 In addition to existing licensing procedures, Projects will be required to demonstrate acceptance of the approved standardized Power Purchase Agreement.

8 Licensing Conditions and Procedures

- 8.1 Any Person who intends to establish a Renewable Energy Power Project under the REFIT shall be obliged to fulfil all the requirements and obligations for licensing according to the Electricity Act, 1999.
- 8.2 The Licensing Procedure for Renewable Energy Power Generators under the REFIT shall be done according to the Electricity Act, 1999.
- 8.3 The Notice of Intended Application, as prescribed by Section 29 of the Electricity Act, 1999, shall be used by ERA for the initial Pre-Qualification of all projects. Over and above the current contents, the prescribed form shall be modified to include;
- (i) The type of Licence required;
 - (ii) Generation and Sale of Electricity under the REFIT as one of the options for the type of Licence required;
 - (iii) Contribution of the project to grid stabilization and reduction in Network Losses;
 - (iv) Acceptance of the standardized Power Purchase Agreement;
 - (v) Socio-Economic impacts to include Economic Development, Employment creation, and contribution to National Development Goals and Objectives;
 - (vi) An indication of the Location and Technical Specifications of the Interconnection Point with the Grid;
 - (vii) Technical and Financial Requirements for Network Integration.
- 8.4 The REFIT Tariff is awarded at the time of the award of a License. Should the License expire, the Tariff shall also expire. Any re-

application or extension of the License will require a New Tariff Application for consideration by ERA.

- 8.5 Existing Project Developers undertaking Feasibility Studies shall be required to request in writing to apply for the REFIT.
- 8.6 Qualified Renewable Energy Power Generators shall be required to pay License Fees to ERA, charged under Section 120 of the Electricity Act, 1999, and under the Electricity (Licence Fees) (Amendment) (No. 3) Regulations, 2014.

9 Monitoring, Reporting, and Review

In addition to the existing and ongoing monitoring and reporting requirements, the following shall apply:

Electricity Regulatory Authority

- 9.1 ERA shall be responsible for the overall implementation, monitoring, and evaluation of the REFIT.
- 9.2 An Annual Monitoring review shall take place at the end of each financial year and shall comprise of:
 - (i) Evaluation of uptake in terms of Technology, Installed Capacity and Location; and,
 - (ii) Assessment of the Tariffs and recommendation on the need to increase or reduce the Tariffs in line with projected Levelized costs of production.
- 9.3 A Programme Review shall take place every Two (2) Years and shall comprise of:
 - (i) Comprehensive assessment of the Levelized Cost of the Energy Model including key assumptions;
 - (ii) Assessment of the list of priority technologies to either add or remove technologies;
 - (iii) Review of capacity limits and adjustment if required, and;
 - (iv) Consultation with key Stakeholders.
- 9.4 Following the initial Four (4) Years of the REFIT, a Pre-Defined Tariff Rate Digression may be put in place for certain Technologies, determined from International Best Practice Annual Digression Rates adjusted to local conditions in the Republic of Uganda. These shall not be used to provide

mandated Tariffs, but shall indicate future Tariffs and projected reductions.

9.5 ERA shall be obliged to gather information and maintain a Database and report annually on the following:-

(i) The Energy Produced and Energy Purchased under the REFIT per Technology Band;

(ii) Financial and Economic Impacts of the REFIT on the Republic of Uganda;

(iii) A Review and Update on the introduction of qualifying Technologies on the market;

(iv) The avoided cost of the Grid;

(v) Progress on the implementation of the REFIT; and,

(vi) Actual Generation Costs.

9.6 There shall be a System Planning and Coordination Committee (SPCC) that comprises institutions including but not limited to ERA, the System Operator, Distribution Licence Holders, the Ministry of Energy and Mineral Development, and the Ministry of Finance, Planning and Economic Development. The SPCC will be charged with identifying and mitigating identified bottlenecks to Renewable Energy Project Development by Independent Power Producers in Uganda.

9.7 ERA shall Oversee and Coordinate the activities of the SPCC.

9.8 The SPCC shall meet every Quarter.

System Operator

9.9 The System Operator shall be obliged to Monitor, Verify, and Report to ERA on:

(i) The total number of Licensed and Operational Renewable Energy Generators by Technology and Installed Capacity;

- (ii) Electricity Production by the Licensed Renewable Energy 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 Generating Plants against the Parameters set by ERA, and;
 - (v) Compliance by Licensed Renewable Energy Generators with the Electricity (Primary Grid Code) Regulations of Uganda, 2003, or any Regulation that will be in the place of these Regulations.
- 9.10 The System Operator shall provide all the necessary information to support ERA in reviewing and updating the avoided costs for the Grid on an annual basis.

Renewable Energy Generators

- 9.11 The Renewable Energy Generators shall be obliged to provide such information to the System Operator as is necessary to facilitate compliance with the Electricity (Primary Grid Code) Regulations, 2003.
- 9.12 The Renewable Energy Generators shall be required to report to ERA on the:
- (i) Total Up-Front and On-Going Capital Investment;
 - (ii) Generation Performance including net maximum capacity generation and the quantity of Renewable Energy generated and fed on to the National Grid under the REFIT;
 - (iii) Plant Capacity Factor;
 - (iv) Operation and Maintenance Costs; and,
 - (v) Fuel Costs (if applicable).

9.13 Additional Generation on existing sites shall be metered separately from the existing Generation where applicable, or as will be agreed upon in the Power Purchase Agreement.

Appendix 1: Schedule of Tariffs, 2021

A1.1 Priority Phase 5 REFIT Technologies

The Priority Renewable Technologies for the REFIT in Phase 5 include:

- (i) Small Hydro Power Plants up to 20 MW; and,
- (ii) Bagasse Cogeneration Plants.

It is noted that this list of Priority Technologies may be updated during each review of the REFIT.

A1.2 2021 REFIT Tariffs and Maximum Technology Capacity Limits (2021 to 2023)

Table A1: REFIT Phase 5 Tariffs, O&M %age, and Payment Period

Technology	Tariff US\$/kWh	O&M %age	Payment Period (Years)
Hydro (10 >= 20 MW)	0.0751	12.9%	20
Hydro (5 >= 10 MW)	Linear Tariff ¹	13.4%	20
Hydro (500kW >= 5 MW)	0.0792	13.8%	20
Bagasse Cogeneration	0.0620	45.8%	20

¹. Computed as a Regressive Allocation of costs with an increase in Plant Size as shown in Table A2.

A1.3 Linear Hydro Tariff (5 to 10 MW)

To reduce the negative impacts of a Stepped Tariff, a Linear Tariff, based on the actual Installed Capacity, was developed for Mid-Range Hydro Projects of **5 MW to 10 MW**. This is described in Table A2.

Table A2: Linear Tariff: Hydro 5>=<=10 MW

Size	Tariff (USDc/kWh)	Size	Tariff (USDc/kWh)	Size	Tariff (USDc/kWh)
5.0	7.92	6.7	7.79	8.4	7.64
5.1	7.92	6.8	7.77	8.5	7.63
5.2	7.91	6.9	7.77	8.6	7.62
5.3	7.91	7.0	7.76	8.7	7.62
5.4	7.90	7.1	7.75	8.8	7.61
5.5	7.89	7.2	7.74	8.9	7.60
5.6	7.88	7.3	7.73	9.0	7.59
5.7	7.87	7.4	7.72	9.1	7.58
5.8	7.86	7.5	7.72	9.2	7.58
5.9	7.86	7.6	7.71	9.3	7.57
6.0	7.85	7.7	7.70	9.4	7.56
6.1	7.84	7.8	7.69	9.5	7.55
6.2	7.83	7.9	7.68	9.6	7.54
6.3	7.82	8.0	7.67	9.7	7.53
6.4	7.81	8.1	7.67	9.8	7.53
6.5	7.81	8.2	7.66	9.9	7.52
6.6	7.80	8.3	7.65	10.0	7.51

Feed-in Tariffs for other Technologies; Biogas, Waste-to-Energy/Biomass, Landfill Gas, and Wind Power are not fixed but a ceiling price and maximum return on equity level(s) are set as indicated in Table A3.

This was based on the fact that these Technologies are yet to be tested on the National Grid. It is, therefore, intended to allow for Bilateral Negotiations while ERA assesses each Project on its merit.

Table A3: Tariff Ceiling and Equity Return

Technology	Maximum Return on Equity	Tariff Ceiling (USDc/kWh)
Biogas	13.5%	11.5
Landfill Gas	13.5%	6.6
Waste-to-Energy/Biomass	13.5%	9.5
Wind Power	13.5%	10.4
Solar PV	10.0%	7.1

Appendix 2: Glossary of Terms

AVOIDED COST

Avoided Cost is the Marginal Cost for the same amount of Energy acquired through other means such as construction, finance, and operation of new efficient Generation Facility at baseload conditions, or purchase from an alternate supplier. This may also include the cost of infrastructure upgrades.

MERIT ORDER DISPATCH

The Merit Order Dispatch ranks Power Plants according to their costs. Those with the lowest costs are dispatched first to meet demand; those with higher costs are only dispatched when demand is high enough.

CO-GENERATION

Co-generation is the simultaneous Generation of Electricity and useful Thermal Energy (heat) at a single plant. This occurs either through the use of Thermal Energy during electricity generation or through the use of Waste Energy for electricity during heating processes. Co-generation is also referred to as Combined Heat and Power (CHP). In the Ugandan context, Co-generation can also refer to the production of electricity as a by-product of an industrial process, without the need for a combined heat and power system to be in place.

CONNECT

Connect means the making and maintaining of contact between the Electrical Systems of Two (2) persons such as may allow the supply of electricity between those systems.

DISTRIBUTION

Distribution refers to the conveyance of Electricity through a Distribution System.

DISTRIBUTION SYSTEM

Distribution System means an Electricity Network consisting of assets operated at a nominal voltage of 33 kV or less. However, it is noted that some lines at 33 kV are regarded as Transmission Lines.

DISTRIBUTOR

A Distributor is a Legal Entity that owns or operates/distributes Electricity through a Distribution System.

EMBEDDED GENERATING UNIT

An Embedded Generating Unit means a Generating unit that is connected to a Distribution System.

EMBEDDED GENERATOR

An Embedded Generator means a generator whose embedded Generating Units are connected to a Distribution System.

GIGA WATT HOUR (GWh)

An Energy Unit in which Electricity Consumption is measured: 1 GWh = 3,600 GJ (Gigajoule) (Joule, Unit of Energy).

GREENHOUSE GASES

Gases primarily Carbon dioxide, Methane, and Nitrous oxide in the earth's lower atmosphere that trap heat, thus causing an increase in the earth's temperature, leading towards the phenomenon of climate change.

INDEPENDENT POWER PRODUCER (IPP)

Independent Power Producers are defined as typically limited liability, Investor-Owned Enterprises that Generate Electricity either for Bulk Sale to an Electric Utility or for retail sale to industrial or other customers under certain conditions.

LEVELIZED COST OF ENERGY (LCOE)

The Levelized Energy Cost is the price at which Electricity must be Generated from a specific source to break even. It is an economic assessment of the cost of the Energy-Generating System including all the costs over its lifetime: initial investment, operations and maintenance, cost of fuel, cost of capital, and is very useful in calculating the costs of generation from different sources.

MAXIMUM INSTALLED CAPACITY

Maximum Installed Project Capacity is the maximum size of the Installed Generation Plant.

PRODUCER SURPLUS

Producer Surplus is the difference between the total income derived from the sale of a product and the costs involved in its production. In the context of the REFIT, this refers to the potential surplus as a result of differences in the cost of production due to the varying sizes and scales of technologies adopted. For Small-Scale Projects, producer surplus will be low, while for large-scale projects, producer surplus will be higher. The potential for a producer surplus is balanced against the need to develop a non-complex and simple-to-implement mechanism.

REFIT

Renewable Energy Feed-In Tariff - A mechanism to promote the deployment of Renewable Energy that places an obligation on specific entities to purchase the output from qualifying Renewable Energy Generators at Pre-Determined Prices.

RENEWABLE ENERGY

Renewable Energy harnesses naturally occurring non-depletable sources of Energy, such as Solar, Wind, Biomass, Hydro, Tidal, Wave, Ocean current, and Geothermal, to produce Electricity, Gaseous, and Liquid fuels, Heat, or a combination of these Energy types.

- **Solar Energy** can be used to Generate Electricity, Heat Water, Cool, and Light Buildings. For example, Photovoltaic Systems capture Energy in sunlight and convert it directly into Electricity. Alternatively, sunlight can be collected and focused on with mirrors to create a high-intensity heat source that can be used to Generate Electricity using a steam turbine or heat engine.
- **Wind Energy** - The naturally occurring Energy of the wind used directly in windmills to Generate Electricity, which can be used, for example, to charge batteries or pump water.

Large modern wind turbines operate together in 'wind farms' to produce Electricity for utilities. Small turbines are used to meet localized Energy needs.

- **Biomass Energy (from organic matter)** can be used to provide heat, make liquid fuels, gas, and Generate Electricity. Fuelwood is the largest source of Biomass Energy, generally derived from trees. However, fuelwood is used unsustainably when new trees are not planted to replace those that have been cut. Fuelwood derived unsustainably cannot be properly defined as renewable. However, as is practiced in many parts of the world, when fuelwood is planted and harvested sustainably, it is renewable.

Other types of Biomass include plants, residues from agriculture, food production, animal feed production or forestry, and organic components in municipal and industrial wastes. A major source of Renewable Electricity in many parts of the world derives from agricultural and animal waste, either through direct combustion or through the production of Biogas (anaerobic digestion of agricultural or animal wastes) to generate Methane which, in turn, is combusted to Generate Electricity (and often heat and electricity – i.e. Co-generation). Landfill Gas is considered to be a Biomass source.

- **Bio-Fuels** in liquid form can be produced from the conversion of Biomass and used for transportation. The Two (2) most common bio-fuels are Ethanol and Bio-Diesel. Fermenting any Biomass that is rich in carbohydrates, such as maize makes Ethanol. Bio-Diesel is made using vegetable oils, animal fats, and algae.
- **Hydropower** uses the movement of water under gravitational force to drive turbines to generate electricity.
- **Wave Power, Tidal Power, and Ocean Currents** can be used to drive turbines to Generate Electricity. Technologies to harness these forms of Power are presently being developed to the stage of commercialization.
- **Geothermal** activity in the earth's crust derives from the hot core of the earth. Examples are the natural geysers and hot water sources employed for Power Generation and space heating or using a deep hot dry rock as heat exchangers by pumping water through the natural rock fissures to produce steam for Power Generation.

TARIFF DIGRESSION

Tariff Digression is a fundamental principle in establishing a Feed-in Tariff, which is used to keep Tariffs in line with evolving cost realities through decreases in the payment level, at either specific points in time, or as capacity targets are reached. Tariff Digression can be established transparently ahead of time, over several years, according to fixed annual percentage declines, or according to a responsive formula that allows the rate of digression to respond to the rate of market growth. The first approach is the one considered for the Uganda REFIT Phase 4. The reduction potential of Electricity Generation costs for Renewable Energy Technologies is based on several factors that include economies of scale, the learning process, technical progress, and rationalization.

TRANSMISSION SYSTEM (TS)

The Transmission System consists of all lines and Substation Equipment where the nominal voltage is above 33 kV. All other equipment operating at lower voltages are either part of the Distribution System or classified as Transmission Transformation Equipment. However, it is noted that in some instances, lines at 33 kV are regarded as transmission lines.

WATT

1 Joule per second of energy consumption or dissipation (1 MW = 1,000,000 W).

Appendix 3: Acronyms

CSP	Concentrating Solar Power
EPC	Engineering, Procurement, and Construction
ERA	Electricity Regulatory Authority
GOU	Government of Uganda
GWh	GigaWatt Hour
HV	High Voltage
IPP	Independent Power Producer
kV	Kilovolt
LCOE	Levelized Cost of Energy
MEMD	Ministry of Energy and Mineral Development
MW	Megawatt
NDP	National Development Plan
NEMA	National Environment Management Authority
O&M	Operation and Maintenance
PPA	Power Purchase Agreement
PPI	Producer Price Index
PV	Photovoltaic(s)
RE	Renewable Energy
REA	Rural Electrification Agency
REFIT	Renewable Energy Feed-In Tariff
RES-E	Electricity from Renewable Energy Sources
RET	Renewable Energy Technologies
UEB	Uganda Electricity Board
UEDCL	Uganda Electricity Distribution Company Limited
UEGCL	Uganda Electricity Generation Company Limited
UETCL	Uganda Electricity Transmission Company Limited

UShs	Uganda Shilling
WACC	Weighted Average Cost of Capital