



## MINISTRY OF ENERGY

# FEED-IN-TARIFFS POLICY ON

# WIND, BIOMASS, SMALL-HYDRO, GEOTHERMAL, BIOGAS AND SOLAR RESOURCE GENERATED ELECTRICITY

Initial Issue: March 2008

1<sup>st</sup> Revision: January 2010

2<sup>nd</sup> Revision: December 2012



**FEED-IN-TARIFFS POLICY  
FOR WIND, BIOMASS, SMALL-HYDRO, GEOTHERMAL, BIOGAS AND SOLAR  
GENERATED ELECTRICITY**

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## 1. DEFINITIONS

In this Feed-in-Tariffs Policy, unless the context otherwise requires, the following capitalised words shall have the following meanings:

- i.* **"AGREEMENT" or "PPA"**: power purchase agreement means the agreement between the Investor and the Off-taker together with any related agreement;
- ii.* **"BUYER"**: Off-taker or purchaser of electrical energy from Feed-in-Tariff power plant.
- iii.* **"COMMISSIONING"**: the conduct of tests necessary to put a Unit or the Plant (as the case may be) into operation and supply to the grid;
- iv.* **"COMMISSIONING DATE"**: the date on which the developed power plant commences the operation of supplying electricity to the grid;
- v.* **"CONNECTION POINT"**: the point of common coupling at which the units sent out from the Seller's Plant (Net Electrical Output) is delivered into Buyer's system;
- vi.* **"CONSUMER PRICES INDEX" or "CPI"**: the index known as "The Consumer Prices Index for All Urban Consumers (CPI-U) for the US City Average for All Items 1982-84 = 100, not seasonally adjusted", as published by the United States Department of Labour, Bureau of Labour Statistics;
- vii.* **"kW"**: abbreviation for kilowatt;
- viii.* **"kWh"**: abbreviation for kilowatt hour being three million six hundred thousand (3,600,000) Joules as defined in ISO 1000.1992(E);



- ix.*     **“MW”**: abbreviation for megawatt being one thousand (1,000) kW;
- x.*     **“OFF-TAKER”**: the Buyer of electrical energy for the purpose of selling the electricity to customers connected to the national grid or off-grid (mini-grid) systems.
- xi.*     **“PLANT”**: Seller’s electrical energy generating power plant ;
- xii.*    **“SELLER”**: Investor/Developer of Feed-in-Tariff power plant.



## 2. INTRODUCTION

### The Policy Framework

1. The government of Kenya recognises that renewable energy sources (RES) which include wind, biomass, small hydros, geothermal, biogas, solar and municipal waste energy, have potential to generate income and employment, over and above contributing to the electricity supply and diversification of generation sources. The National Energy Policy as enunciated in Sessional Paper No.4 of 2004 and operationalized by the Energy Act No. 12 of 2006, encourages implementation of these indigenous renewable energy sources to enhance the country's electricity supply capacity. The Sessional Paper incorporates strategies to promote the contribution of the renewable energy sources in generation of electricity.
2. In *Sessional Paper No. 4 of 2004 on Energy* the Government committed to promote electricity generation from Renewable Energy Sources (RES). The Energy Act 2006 Part V Section 103 on 'Promotion of Renewable Energy and Energy Conservation', empowers the Minister responsible for Energy to promote development and use of renewable energy technologies.
3. In Section 6.3.2 of the *Sessional Paper No. 4 of 2004 on Energy*, the Government committed to promote co-generation in the sugar industry and other establishments where the opportunity exists to meet a target of 200 MW by 2015.
4. Section 6.4.1 (i)-(iv) of the *Sessional Paper No. 4 of 2004 on Energy* provides for the government to undertake pre-feasibility and feasibility studies on the potential for RES and for the packaging and dissemination of information on renewable energy sources to create investor and consumer awareness on the economic potential offered by other renewable sources of energy.
5. Pursuant to these policy strategies and in recognition of the potential of renewable energy sources in Kenya, the Ministry of Energy (MoE) has encouraged potential Independent Power Producers (IPPs) to carry out feasibility studies on renewable energy generation on the basis of which Power Purchase Agreements (PPAs) with the Off-taker can be negotiated.
6. In view of the time and resources required to undertake feasibility studies, the Ministry of Energy prepared a *Position Paper* in FY 2007/08 proposing to set Feed-in-Tariffs (FiT) for electricity generated from renewable energy sources; specifically wind, biomass and small hydro in order to safeguard the investments made by the respective developers in data collection undertaking feasibility studies; and to boost the development of Renewable Energy Sources Electricity (RES-E) generation.



## The Feed-in-Tariff Instrument

7. A Feed-in-Tariff (**FiT**) is an instrument for promoting generation of electricity from renewable energy sources. A Feed-in-Tariff allows power producers to sell renewable energy generated electricity to an Off-taker at a pre-determined tariff for a given period of time. Renewable energy sources in Kenya include wind power, biomass, small hydro, solar, biogas and geothermal.
8. The objectives of the FiTs system are to:
  - a) Facilitate 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 associated with the conventional procurement processes;
  - c) Encourage private investors to operate their power plants prudently and efficiently so as to maximize returns.
9. The advantages of electricity from renewable energy sources include:
  - a) Environmental integrity including the reduction of greenhouse gas emissions (where feasible, project developers are encouraged to pursue carbon credit benefits);
  - b) Enhancing energy supply security, reducing the country's dependence on imported fuels, and coping with the global scarcity of fossil fuels and its attendant price volatility;
  - c) Enhancing economic competitiveness, job creation and other local economic benefits.
10. The Feed-in-Tariffs Policy for wind, biomass and small hydro was published in March 2008 following approval by the Public Procurement Oversight Authority. The 2008 FiT Policy covered wind, small hydro and biomass sources, for plants with capacities not exceeding 50 MW, 10 MW, and 40 MW respectively.
11. The 1<sup>st</sup> revised version of the Feed-in-Tariffs Policy guideline published in January 2010 contained revised tariffs for wind and biomass, and included new tariffs for geothermal, biogas and solar resources.
12. Potential developers of biomass and biogas generated electricity have shown interest in developing generation projects. However, the tariffs have not been attractive enough to progress these potential projects to PPA negotiation stage and funding. The lower capacity limit for biogas plants necessitated review to accommodate smaller biogas plants.



13. The feedback from the PPA negotiation process has necessitated review of some of the policy clauses for clarity and also to ease interpretation of the policy as well as negotiation and implementation of Power Purchase Agreements.
14. There is increased interest for investment in solar energy resource to supply the national grid. However, the 1st Revision January 2010 tariffs policy had no provision for grid connected solar energy. Recent trends show a significant decrease in solar generation equipment prices, which may have contributed to the increased interest in grid connected solar energy in Kenya.
15. The FiT Policy provides for review every three years from the date of publication. However, due to the reasons given in the clauses above, it has been deemed necessary to undertake a mid-term review to facilitate accelerated investment in generation from renewable sources, as well as incorporate grid connected solar energy plants.
16. A comprehensive review of FiT Policy was therefore initiated in late 2011. The review has been done prudently so as not to negatively affect the economic growth and social wellbeing.
17. The Committee's work has been supplemented by a comprehensive study commissioned under the Kenya Electricity Expansion Project. Entitled "Technical and Economic Study for Development of Small Scale Grid Renewable Energy in Kenya", the main objective of the study was to minimise the transactions costs for the Off-taker and for small power producers and thereby speed up the implementation of FiT projects.
18. Guided by a Steering Committee, the study involved extensive consultations with all interested parties, leading to a set of recommendations around which a consensus was built. These recommendations form the basis for some of the important changes being made in this policy statement.
19. One of the main recommendations of the study is to reduce the transactions costs associated with negotiating and signing a PPA for a small renewable generator. This is achieved through introducing a Standardised PPA limited to projects of up to 10 MW, connected at distribution voltages as embedded, non-despatchable generators.
20. For larger projects, the study recommends that the Government carries out resource assessments and solicited bidding process for the projects identified.
21. Non-solicited renewable projects larger than 10 MW may also be accepted but they have to pass load flow and system stability tests.
22. The policy has introduced improvements to the FiT calculation model, to include a linear interpolation method to adjust the tariff for the actual capacity of the generation project.



### 3. POLICY STATEMENTS ON SPECIFIC ISSUES

#### Small Renewable Energy Projects (capacity up to 10 MW) Connected to the Grid

23. For grid connected renewable generators of up to 10 MW (ten megawatts) of installed capacity the power purchase agreement will be a Standardised PPA. While the tariffs offered (as provided in the Addendum to this policy) are technology-specific, the Standardised PPA is technology-neutral.
24. The **Standardised PPA** incorporates the following features:
- (a) there is no bidding for renewable sites and resources – a first come, first served system applies;
  - (b) the plants are ‘embedded’, that is not despatchable by the National Control Centre;
  - (c) they are connected at distribution voltages;
  - (d) the PPA is offered to projects that demonstrate technical and economic viability, meet the grid connection requirements and are able to secure all necessary legal and regulatory approvals and financing. The PPA is standardised as far as possible and has only a limited number of negotiable clauses.
25. FiT values for small renewable projects are provided in the Appendix 1 to this policy. The following policy principles underlie the calculation of these FiT values:
- (a) FiT values are calculated on a technology-specific basis using the principle of cost plus reasonable investor return;
  - (b) FiT values shall not exceed the generation Long Run Marginal Costs (LRMC), as established in the Least Cost Power Development Plan (LCPD) except solar power plants for Off-grid;
  - (c) the FiT is denominated in US dollars or the equivalent for other currencies converted at the Mean Exchange Rate on the Effective Date of the Power Purchase Agreement published by Central Bank of Kenya;
  - (d) the FiT is calculated for certain specific capacity categories, with a linear interpolation being used to set the value based on the actual capacity of the project;



(e) the FiT applicable at the time a PPA is signed is the fixed value which will apply over the 20 year life of the PPA, except for the O&M component (**the Indexed Component**) of the FiT will be subject to annual indexation using the US Consumer Price Index, using the base index prevailing at the time of signing the PPA.

26. The escalable portion of the tariff for each respective technology is provided in Appendix 1 and 2.
27. The cumulative capacity contribution by FiT projects of up to 10 MW shall not exceed 10% of system-wide generation capacity. When the total installed capacity of the embedded generators approaches the 10% limit, Government will consider undertaking a comprehensive study to determine whether a higher level of embedded capacity can be accommodated.
28. Capacity limits for FiT projects shall be as set out in Appendix 1 and 2.

#### **Large renewable energy projects (capacity exceeds 10 MW)**

29. Renewable energy projects which are larger than 10 MW of installed capacity shall meet loadflow/dispatch and system stability requirements.
30. The projects to be considered under this policy would have capacity capped as specified in Appendix 2.
31. For large projects involving utilisation of significant national renewable resources, Government preference is to carry out preliminary identification studies and then initiate a competitive bidding process. In this approach, Government will solicit bidders, short list them on the basis of qualifications and competencies, and at the full proposal stage have the short listed candidates compete for the lowest levelised price.
32. The FiTs for unsolicited proposals are provided in Appendix 2 of this Policy, derived based on the principles stated in Clause 25.

The basis for the PPA in the case of the larger renewable generators is the **Standardised Power Purchase Agreement for generators greater than 10 MW**. This is a PPA template that is standardised as far as possible and has only a limited number of negotiable clauses.

## **4. DESIGN OF FEED-in-TARIFFS**

33. Electricity generation costs vary **according to the RES-E technology used**. Therefore, **the FiT levels are technology specific** and depend on:



- a) The investment costs for the plant (including the costs of feasibility studies, site development, construction costs, and the costs of connecting to the transmission system including transmission lines, substations and associated equipment);
  - b) The Operations and Maintenance (O&M) Costs;
  - c) Fuel costs where applicable;
  - d) Financing costs (including interest during construction) and a fair return on the invested capital. The availability of concessionary finance will be taken into account when estimating such costs;
  - e) Estimated lifetime of the power plant;
  - f) Amount of electricity to be generated.
34. The FiTs are based on the actual generation costs in Kenya, but also have regard to the FiT policies in other parts of the world and the specific socio-economic conditions in Kenya.
35. FiTs are also based on the best estimates of different load factors of energy availability.
36. FiTs are grouped according to plant capacity as necessary. Linear interpolation will be used between groups to provide incentives for developers to opt for larger capacities than they might otherwise do. Larger capacities are in the best interests of the country.
37. The Government of Kenya guarantees access to the grid (Transmission and Distribution) pursuant to the provisions of the national Grid Code.

### **Feed-in-Tariff for Wind Energy Resource Generated Electricity**

38. The *Wind Energy Resource Atlas of Kenya* gives indicative information about the wind potential in various parts of Kenya. The *Atlas* provides broad information on a national scale. Therefore detailed feasibility studies are required for each site, since wind energy resource potential is site-specific.
39. The Ministry of Energy is mapping out potential areas for wind energy resource exploitation, and has therefore installed data collection equipment at various sites around the country.
40. The potential sites to be proposed by developers for commercial development or feasibility studies shall be located not less a 50 km radius from sites where the Ministry of Energy has installed wind energy data collection devices for resource mapping and sites already approved for development. Information on the location of Ministry of Energy wind masts and existing project approved for development can be obtained from the Ministry offices.



41. 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.
42. To attract private sector capital in wind resource electricity generation, the Ministry of Energy hereby establishes the FiT for Wind Energy Resource generated electricity.
43. The FiT for small renewable energy projects (up to 10 MW) is set out in the Appendix 1 to this policy while the tariffs for larger renewable projects are set out in Appendix 2.
44. The FiT shall apply for 20 years from the date of the first commissioning of the wind power plant.

#### **Feed-in Tariff for Biomass Energy Resource Generated Electricity**

45. For the purposes of this tariff, biomass refers to plant or animal based energy resource and includes agricultural waste, agricultural products, municipal waste, bio-fuels and fuel wood.
46. Biomass FiTs include both 'Biomass - Waste' and 'Biomass - Grown' power plants. 'Biomass - Waste' refers to biomass-based power plants using agricultural waste (including bagasse) or municipal waste, for the majority of its fuel. 'Biomass - Grown' refers to biomass-based power plants using agricultural products (grown specifically for the purpose of burning as fuel for power plants), bio-fuels and fuel wood.
47. Where biomass is used together with fossil fuels for the purposes of producing energy, to be eligible for payment at the FiT values biomass shall contribute not less than 70% of the monthly fuel consumption.
48. To attract private sector capital in biomass energy resource electricity generation, the Ministry of Energy hereby issues the revised FiTs for Biomass Energy Resource generated electricity. The FiT values for small renewable energy projects (up to 10 MW) are set out in the Appendix 1 to this policy while the tariffs for larger renewable projects are set out in Appendix 2.
49. The FiT shall apply for 20 years from the date of the first commissioning of the Biomass power plant.

#### **Feed-in Tariff for Small Hydro Power Resource Generated Electricity**

50. An assessment of small hydro resource potential carried out by the Ministry of Energy indicates that there are many suitable sites for small hydro power development in the country. Substantial investments are however needed to carry out detailed feasibility



studies need to be carried to establish the economic viability of specific sites for power generation.

51. To attract private sector capital in small hydropower resource electricity generation, the Ministry of Energy hereby establishes the FiT for small hydro power resource generated electricity. The FiT values for small renewable energy projects (up to 10 MW) are set out in the Appendix 1 to this policy and in Appendix 2 for larger projects.
52. The FiT shall apply for 20 years from the date of the first commissioning of the small hydro power plant.

### **Feed-in Tariff for Geothermal Energy Resource Generated Electricity**

53. For the purposes of this tariff, geothermal refers natural thermal energy resource obtained from heat in the upper crust of the earth surface.
54. The geothermal potential in the country is estimated at 7,000-10,000 MW, located mainly in the Rift Valley Province in 14 major prospective sites.
55. To attract private sector capital in geothermal energy resource electricity generation, the Ministry of Energy hereby issues the revised FiT for geothermal Energy Resource generated electricity. The FiT values for small renewable energy projects (up to 10 MW) are set out in Appendix 1 to this policy and in Appendix 2 for larger projects.
56. The FiT shall apply for 20 years from the date of the first commissioning of the geothermal power plant.

### **Feed-in Tariff for Biogas Energy Resource Generated Electricity**

57. For the purposes of this tariff, biogas energy refers to renewable energy from gas-based energy resources such as agricultural waste and municipal waste.
58. 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 Ministry of Energy hereby issues the FiT for Biogas Energy Resource generated electricity. The FiT values for small renewable energy projects (up to 10 MW) are set out in Appendix 1 to this policy.
59. The FiT shall apply for 20 years from the date of the first commissioning of the Biogas power plant.



## **Feed-in Tariff for Solar Energy Resource Generated Electricity**

60. For the purpose of this tariff, solar refers to photovoltaic (PV) or thermal energy resource obtained from the sun. The thermal solar energy encompasses concentrated solar energy.
61. Due to Kenya's strategic location along the equator, the daily average solar radiation is above 6 kWh/m<sup>2</sup>.
62. To attract private sector capital in solar energy resource electricity generation, the Ministry of Energy hereby issues the Feed-in-Tariff for Solar Energy Resource generated electricity. The FiT values for small renewable energy projects Appendix 1 to this policy and in Appendix 2 for larger projects.
63. Besides feeding into the national grid, solar technology is intended to be used to supply the off-grid (mini-grids) systems, to partly displace the fossil oil based thermal generation. Tariffs and the duration of the PPA for isolated mini-grids are set out in Appendix 1 to this policy.
64. These tariffs shall apply for 20 years from the date of the first commissioning of the solar based power plant.

## **5. CONNECTION OBLIGATIONS**

65. The Feed-in-Tariffs values set in this policy include a standardised 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.
66. The interconnection costs will be paid by the developer upfront. With prior arrangements, the Off-taker may construct or upgrade its grid at a reasonable economic expense to facilitate interconnection and meet all technical requirements and recover the associated costs from the Seller through the Feed-in-Tariff. .

## **6. PURCHASE OBLIGATION**



67. Subject to the costs being met by the developer, the Off-taker shall connect plants generating electricity from renewable energy sources.
68. The Off-taker shall guarantee priority purchase, transmission and distribution of all electricity supplied by small renewable energy projects (capacity up to 10 MW) as defined in this policy.
69. The purchase and transmission and distribution of electricity supplied by large renewable energy projects (capacity exceeds 10 MW) shall be subject to the terms of the negotiated PPA. The *Standardised PPA* template is to be used as basis for negotiations by the two sides.
70. The Off-taker shall recover from electricity consumers 70% of the portion of the feed-in tariff except for solar plants connected to off-grid systems, where the Off-taker shall recover 85%, or as may be directed by the national Energy Regulatory Commission at the time of approval of the PPA or review thereafter. The pass through costs shall enable the Off-taker to remain revenue neutral after contracting a Feed-in-Tariff power plant.

## 7. APPLICATION AND IMPLEMENTATION PROCEDURES

71. Renewable energy generators feeding into the grid will require a PPA. The project sponsor for such renewable generation projects must be an entity legally registered in Kenya, such as a private or public company, a limited liability partnership, a civil society organization, a trust, a public agency or government authority.
72. The procedures for applying for and implementing the FiT shall follow the Application and Implementation Guidelines, as published by the Government, the first step being the submission of an Expression of Interest (EOI).

## 8. COMPLIANCE WITH TECHNICAL, LEGAL AND REGULATORY REQUIREMENTS

73. All projects implemented under the Feed-in-Tariff system shall comply with all other relevant technical, legal and regulatory requirements of the Republic of Kenya.
74. In particular, projects will abide by the provision of the *Connection Guidelines for Small-Scale Renewable Generation Plant* as well as the *national Grid Code*.

## 9. REVIEW OF FEED-IN-TARIFFS



75. This Feed-in-Tariffs policy shall be subject to review every three years from the date of publication. However, a policy review may be undertaken earlier than three years in exceptional cases. Any changes made during such reviews shall only apply to RES-E power plants that shall be developed after the revised guidelines are published. For the avoidance of doubt, FiT values applying to PPA contracts entered into previously will remain unchanged.



## ADDENDUM – FiT VALUES

76. The FiT values for small renewable projects (up to 10 MW of installed capacity) connected to the grid are provided in the tables below. FiT values apply to the closest 1 MW increment in capacity.

### Appendix 1

#### The FiT values for small renewable projects (up to 10 MW of installed capacity) connected to the grid

	Installed capacity (MW)	Standard FiT (US \$/ kWh)	Percentage Escalable portion of the Tariff	Min. capacity (MW)	Max. capacity (MW)
Wind	0.5 -10	0.11	12%	0.5	10
Hydro*	0.5	0.105	8%	0.5	10
	10	0.0825			
Biomass	0.5-10	0.10	15%	0.5	10
Biogas	0.2-10	0.10	15%	0.2	10
Solar (Grid )	0.5-10	0.12	8%	0.5	10
Solar (Off-grid)	0.5-10	0.20	8%	0.5	1

\*For values between 0.5-10MW, interpolation shall be applied to determine tariff for hydro.

### Appendix 2

#### The FiT values for renewable projects above 10 MW of installed capacity

	Installed capacity (MW)	Standard FiT (US \$/ kWh)	Percentage Escalable portion of the Tariff	Min. capacity (MW)	Max. capacity (MW)	Max. Cumulative capacity (MW)
Wind	10.1-50	0.11	12%	10.1	50	500
Geothermal	35-70	0.088	20% for first 12 years and 15% after	35	70	500
Hydro	10.1-20	0.0825	8%	10.1	20	200
Biomass	10.1-40	0.10	15%	10.1	40	200
Solar (Grid )	10.1-40	0.12	12%	10.1	40	100

