



# MINISTRY OF ENERGY

## FEED-IN-TARIFFS POLICY ON WIND, BIOMASS, SMALL-HYDRO, GEOHERMAL, BIOGAS AND SOLAR RESOURCE GENERATED ELECTRICITY

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

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## INTRODUCTION

1. The government of Kenya recognises that renewable energy sources (RES) including wind, biomass, small hydros, geothermal, biogas and solar and municipal waste energy have potential for income and employment generation, over and above contributing to the supply and diversification of electricity 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 contributions of the renewable energy sources in the generation of electricity.
2. In tandem with these documents, the Ministry of Energy established a Feed-in Tariff policy (FiT) in 2008 covering wind, small hydro and biomass sources, for plants with capacities not exceeding 50MW,10MW, and 40MW respectively. Two power purchase agreements have been signed. Negotiations are ongoing for establishment of PPA with another four Developers, while a further twelve projects are at the verge of completing feasibility study.
3. Recent submissions received from potential Investors have power generation tariffs significantly higher than the feed-in-tariffs. Developers are stating that they that they are unable to undertake projects at the set tariff regimes, citing increase in cost of generation equipments and financing. Reasons for this new development also include better tariffs in other markets.This is manifested by lack of sufficient number of developers who are able to reach financial close for their projects. It is apparent that to attract private investment, a realistic review of the tariffs needs to be undertaken, while also widening the scope to cover all the other green energy sources, particularly geothermal. The review will be done prudently, so as not to negatively affect the economic growth and social wellbeing.
4. The FiT Policy provided for review every three years from the date of publication. However, due to the reasons given in clause 3 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 other renewable energy resources namely, geothermal, biogas and solar.

### **The Policy Framework – Sessional Paper No. 4 of 2004 on Energy**

5. In *Sessional Paper No. 4 of 2004 on Energy* the Government is 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 to promote development and use of renewable energy technologies.
6. 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 300 MW by 2015.



7. 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.
8. Pursuant to these policy strategies and in recognition of the potential of renewable energy sources in Kenya, the Ministry of Energy has encouraged potential Independent Power Producers (IPPs) to carry out feasibility studies on renewable energy generation on the basis of which power purchase agreements with the Kenya Power and Lighting Company (KPLC) can be negotiated.
9. In view of the time and resources required to undertake feasibility studies, the MoE prepared a *Position Paper* in FY 2007/08 proposing to set Feed-in-Tariffs 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.
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.
11. This 1<sup>st</sup> revised version of the Feed in Tariffs Policy guideline contains revised tariffs for wind and biomass, and includes new tariffs for geothermal, biogas and solar resources. The tariffs for small hydro power remain unchanged.

### **The Feed-in-Tariff Instrument**

12. 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 Sources Generated Electricity (**RES-E**) to a distributor at a pre-determined fixed tariff for a given period of time. Renewable energy sources include wind power, biomass, small hydro, solar, biogas, geothermal and wave power.
13. 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 by eliminating the conventional bidding processes.
  - c) Encourage private investors to operate their power plants prudently and efficiently so as to maximize returns.



14. The advantages of RES-E include:

- a) Environmental integrity including the reduction of greenhouse gas emissions;
- 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 and job creation among others.

15. It is envisaged that by adopting the FiTs system, Kenya's energy sector will improve its rating as an attractive destination for substantial private sector capital thereby facilitating the exploitation of the abundant local renewable energy sources.



## DESIGN OF FEED-in-TARIFFS

16. 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,
  - b) The Operations and Maintenance (O&M) Costs
  - c) Fuel costs where applicable
  - d) Financing costs and return on the invested capital
  - e) Estimated lifetime of the power plant;
  - f) Amount of electricity to be generated
17. The avoided cost typically comprise the energy cost incorporating the fuel cost and a portion of the O& M costs.
18. Since generation costs differ for different RES-E technologies the FiTs design provide technology specific tariff levels incorporating the electricity generation costs and a fair return on the investment.
19. The Feed-in-Tariffs are based on the generation cost but having regard to the avoided cost, the Feed-in-Tariffs in other parts of the world and the specific socio-economic conditions in Kenya.
20. The avoided costs are estimated based on the current energy cost from a recently procured efficient thermal plant supplying the Kenyan grid, currently a Medium Speed Diesel (MSD), and the least expensive fuel oil, in this case HFO 180 cSt. Due to the constant evolution of global oil prices the avoided cost vary over time.
21. The RES-E generation costs will be based on the best estimates at different load factors of energy availability;
22. The current cost estimates, both for a Medium Speed Diesel plant at Mombasa and upcountry, in close proximity to the major load centre i.e. Nairobi are summarised in Table 1.

**Table 1: Energy Generation Cost in US Cts/kWh for Medium Speed Diesel Plants in Mombasa and Nairobi, Respectively (March-October 2009)**

Month	Global Crude Oil Prices (US\$/bbl)	Fuel Cost (US¢/kWh)	
		Mombasa	Nairobi
Mar-2009	46	6.80	8.72
Jul-2009	65	10.42	13.10
Oct-2009	73	11.27	13.40



23. The FiTs will be on either firm or non-firm basis and will include the grid connection costs. The FiTs will also be stepped as necessary.
24. The Government of Kenya guarantees access to the grid (Transmission and Distribution) pursuant to the provisions of the Grid Code.
25. The duration of support for each RES-E technology will be determined by the economic life of the RES-E plant.

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

26. 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.
27. 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.
28. To attract private sector capital in wind resource electricity generation, the Ministry of Energy hereby establishes the Feed-in-tariff (FiT) for Wind Energy Resource generated electricity.
29. A fixed tariff not exceeding **US Cents 12.0** per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the interconnection point.
30. This tariff shall apply to individual wind power plants (wind farms) whose effective generation capacity is above 500kW and does not exceed 100 MW, subject to clause 31.
31. This tariff shall apply to the first cumulative 300 MW capacity of Wind power plants developed in the country under this tariff policy.
32. This tariff 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**

33. For the purposes of this tariff, biomass refers to plant or animal based energy resource and includes agricultural waste, municipal waste, biofuels and fuel wood.
34. The Ministry of Energy has conducted a pre-feasibility study on cogeneration from *bagasse* i.e. sugarcane waste, and established that there is potential for immediate development of about 200 MW from the use of bagasse produced at the six sugar mills operating in Nyanza and Western Provinces.
35. Potential investors have also shown interest in other forms of biomass including, agricultural waste and municipal waste.
36. To attract private sector capital in biomass energy resource electricity generation, the Ministry of Energy hereby issues the revised Feed-in-Tariff for Biomass Energy Resource generated electricity.
37. A firm power fixed tariff not exceeding **US Cents 8.0** per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the Biomass power plant.
38. Where biomass is used together with fossil fuels for the purposes of producing firm power, Biomass shall contribute not less than 70% of the annual fuel consumption, otherwise non-firm power tariff shall apply.
39. The firm power tariff shall apply to the first 200MW of firm power generating, biomass based power plants developed in the country.
40. A non-firm power fixed tariff not exceeding US Cents 6 per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the Biomass power plant.
41. The non-firm power tariff shall apply to the first 50MW of non-firm power generating, biomass based power plants developed in the country.
42. The tariffs shall apply to individual biomass power plants whose effective generation capacity above 500kW and does not exceed 100MW, subject to clause 38 and 40.



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

43. For the purposes of this tariff, Small hydro power plant means the hydro based power plants whose installed capacity is greater or equal to 500kW but less than or equal to 10 MW.
44. An assessment of small hydro resource potential carried out by the Ministry of Energy indicates that there are suitable sites for small hydro power development in the country. Substantial investments are however needed to carry out detailed feasibility studies to establish the economic viability of the said sites for power generation.
45. To attract private sector capital in small hydros resource electricity generation, the Ministry of Energy hereby establishes the feed-in-tariffs (FiT) for small hydro power resource generated electricity.
46. A stepped fixed tariff for small hydro power generated electricity not exceeding the prices shown in the Table 2 below shall apply on electrical energy supplied in bulk to the grid operator at the interconnection point.

Table 2

Power Plant Effective Generation capacity (MW)	Firm Power Tariff (¢/kWh)	Non-Firm Power Tariff (¢/kWh)
< 1	12.0	10
1 - 5	10.0	8.0
5 - 10	8.0	6.0

47. The tariffs shall apply for 20 years from the date of the first commissioning of the small hydro power plant
48. The firm power tariff shall apply to the first 150MW of small hydro, firm power generating stations developed in the country.
49. The non-firm power tariff shall apply to the first 50MW of small hydro non-firm power generating stations developed in the country.
50. The tariffs shall apply to individual small hydro power plants whose effective generation capacity does not exceed 10MW, subject to clause 47 and 48.



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

51. For the purposes of this tariff, geothermal refers natural thermal energy resource obtained from heat in the upper crust of the earth surface.
52. Sessional Paper No. 4 of 2004 on Energy Clause 6.1.2 on geothermal, the Government recognizes that accelerated development of geothermal resources will require joint effort from both public and private sectors.
53. The country's development blue print Vision 2030 envisions the development of at least 4000MW of geothermal generation capacity by year 2030.
54. The potential geothermal in the country is 7,000 MW located mainly in the Rift Valley Province in 14 major prospective sites.
55. Potential investors have also shown interest in geothermal power generation.
56. To attract private sector capital in geothermal energy resource electricity generation, the Ministry of Energy hereby issues the revised Feed-in-Tariff for geothermal Energy Resource generated electricity.
57. A fixed tariff not exceeding **US Cents 8.5** per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the geothermal power plant.
58. This tariff shall apply to the first 500 MW of geothermal power capacity developed in the country under this tariff policy.
59. The tariffs shall apply to individual geothermal power plants whose effective generation capacity will not exceed 70 MW, subject to clause 57.

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

60. For the purposes of this tariff, biogas refers to gas based energy resource and includes agricultural waste and municipal waste.
61. Recent studies estimate the potential for immediate development of about 130 MW from the use of municipal waste, sisal and coffee production among others.
62. Potential investors have also shown interest in generating electricity using biogas.
63. To attract private sector capital in biogas energy resource electricity generation, the Ministry of Energy hereby issues the Feed-in-Tariff for Biogas Energy Resource generated electricity.



64. A fixed tariff not exceeding US Cents 8 per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the Biogas power plant.
65. This tariff shall apply to the first 100MW of power generated using biogas.
66. A non-firm power fixed tariff not exceeding US Cents 6 per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the interconnection point. This tariff shall apply for 20 years from the date of the first commissioning of the Biogas power plant.
67. The non-firm power tariff shall apply to the first 50MW of non-firm power generating, biogas based power plants developed in the country.
68. This tariff shall apply to individual biogas power plants whose effective generation capacity are equal or above 500kW and does not exceed 40MW, subject to clause 64 and 66.

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

69. For the purposes of this tariff, solar refers to photovoltaic (PV) or thermal energy resource obtained from the sun.
70. Due to Kenya's strategic location along the equator, the daily average solar radiation is above 6kWh/m<sup>2</sup>.
71. Potential investors have also shown interest in commercial electricity generation using PV solar systems.
72. 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.
73. Due to the relative high cost of this technology, it is intended to be used to supply the isolated/off-grid stations, to partly displace the thermal generation. These isolated power stations are at Lamu, Lodwar, Mandera, Marsabit, Wajir, Merti, Habasweni, Elwak, and Baragoi. The Ministry also is establishing, and intends to establish others in remote trading centres, including, Pate Island, Lokichogio, Kakuma, Lokitaung, Lokichar, Rhamu, Ijara, Eldas, Modogashe, Takaba, Maikona, Korr, among others.



74. A fixed tariff not exceeding US Cents 20.0 per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the connection point. This tariff shall apply for 20 years from the date of the first commissioning of the Solar power plant.
75. These tariffs shall apply to the first 100 MW of power generated using solar resource.
76. A non-firm power fixed tariff not exceeding US Cents 10.0 per Kilowatt-hour of electrical energy supplied in bulk to the grid operator at the connection point. This tariff shall apply for 20 years from the date of the first commissioning of the solar based power plant.
77. The non-firm power tariff shall apply to the first 50MW of non-firm power generating, solar based power plants developed in the country.
78. This tariff shall apply to individual solar power plants whose effective generation capacity are equal to or more than 500kW and does not exceed 10MW, subject to clause 75 and 77.

## **CONNECTION OBLIGATIONS**

79. The Feed-in-Tariffs include interconnection costs – transmission, substations and associated equipment - therefore grid system operators shall connect plants generating electricity from renewable energy sources specified in this document.
80. Where necessary, the grid system operator shall construct or upgrade its grid at a reasonable economic expense to facilitate interconnection. The interconnection costs including transmission/distribution lines and substations construction or upgrading shall be recovered by the grid operators from the Feed-in-Tariff.

## **PURCHASE OBLIGATION**

81. The grid system operators shall connect plants generating electricity from renewable energy sources and guarantee priority purchase, transmission and distribution of all electricity from renewable energy sources specified in this document.
82. Grid operators shall pay a tariff agreed upon between them and the power producer subject to the maximum tariffs and maximum capacities specified in this document.
83. Grid operators shall recover from electricity consumers 70% of the portion of the feed-in tariff except for solar which will be 85%, or as may be directed by the Energy Regulatory



Commission at the time of the approval of the PPA or review thereafter. This in other words, will be a pass-through cost.

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

### **IMPLEMENTATION PROCEDURES**

85. The following procedures shall apply in the implementation of the Feed-in-Tariff.
- a) Private investors who wish to become power producers shall send an expression of interest (EOI) to the Ministry of Energy. The EOI shall include preliminary information such as the renewable energy source to be used, location in the country where the power plant is to be located, proposed installed capacity, indicative tariff, expected duration of plant development and any other information that the private investors wishes to disclose to facilitate decision making.
  - b) A Feed-in-Tariff Committee comprising representatives of the Ministry of Energy, the grid operator (KPLC) and the Energy Regulator (ERC) will review the EOI. The purpose of the review is to determine how the proposed power plant can be integrated into the national power development plan and estimate suitability of proposed power plant location for interconnection including interconnection facilities and costs.
  - c) The results of the review shall be communicated to the private investor by the Feed-in-Tariff Committee within three months from the date of receipt of the EOI. The EOI may be accepted or rejected and where it is rejected, the reason for the rejection shall be provided.
  - d) Where the EOI is accepted and no further studies are required, the applicant shall be asked to provide a detailed proposal describing the technical and financial viability of the project, proposed financing arrangements, etc.
  - e) Where the EOI is accepted, the applicant shall be notified and given non-renewable rights of first refusal for the use of the same technology for power generation at the same location for a period of two years.
  - f) Where the EOI is accepted and further studies need to be carried out to determine project viability, the applicant shall be given 12 months to carry out and conclude the studies. Progress report shall be provided to the Feed-in-Tariff Committee after 6 months. Where the 6 months progress report shows that the project is not viable



within the feed-in tariffs, the a project shall be abandoned and the rights of refusal will lapse.

- g) Where the detailed proposal received under (d) or feasibility studies carried out under (e) **confirms** that the project is viable within the feed-in tariffs, the applicant shall be given another 6 months to **conclude** the studies and project development including engineering design, financing arrangements, and PPA (standard) negotiations with the grid operators etc.
- h) Construction works of all projects to be implemented under the Feed-in-Tariff system shall commence within 6 months from the date of the signing of the PPA. The project shall be completed and commissioned within a period of 24 months from the date of the signing of the PPA.

#### **COMPLIANCE WITH TECHNICAL, LEGAL AND REGULATORY REQUIREMENTS**

- 86. 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.



## **REVIEW OF THE FEED-IN-TARRIFS POLICY**

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