

MINISTRY OF ENERGY



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DEVELOPMENT OF SMALL HYDRO-POWER GENERATION PLANTS IN WESTERN KENYA

Introduction

The Ministry of Energy recognizes the importance of access to adequate and reliable supply of electricity to all Kenyans for socio-economic development. In this regard, energy supply is critical transformation to the achievement of the Millennium Development goals and the realization of Vision 2030.

In pursuit of its electricity supply diversification policy, the Ministry of Energy has embarked on measures to reduce the cost of electricity to spur economic growth. To this end, the Ministry of Energy is committed to increasing the share of electricity generation from renewable sources which include small hydro, wind, biomass including sugar production based co-generation, solar, geothermal and biogas.

The advantages of generation of electricity from renewable resources include:

a) Environmental integrity through reduction of greenhouse gas emissions;

- b) Enhancing energy supply security by reducing the country's dependence on imported fuels;
- c) Enhancing price stability thereby making Kenya's goods and services competitive.

Feasibility Studies on Small Scale Hydro Potential

Kenya is endowed with a substantial potential of untapped hydropower resource, estimated at 3000 MW. These are mainly located in the Lake Victoria drainage basin and the Mount Kenya-Aberdare range catchments region. However, only about 10 MW of small hydros has been developed for own use mainly by institutions and commercial agricultural enterprises.

In order to achieve full exploitation of this resource, the Ministry of Energy has been undertaking a number of studies to assess the technical, economic and financial viability of targeted small hydropower potential sites around the country. Through this strategy the Ministry of Energy has completed feasibility studies on twelve small hydropower sites.

The projects which have a combined potential of 15.2 MW are listed in table 1 and their development cost is KShs. 4.383 billion.

Table 1. Locations of Potential Small Hydro Power Sites

	Project Name	District	Estimated Capacity (MW)	Estimated Implementation Cost (Kshs)
1.	Iraru Kionyo	South Imenti	1.1	188,000,000
2.	Mutonga Kinooro	South Imenti	1.55	579,000,000
3.	South Mara Weru	Nithi	0.26	500,000,000

4.	Thuci Rukuriri	Nithi/Embu	2.015	233,492,978
5.	Kiringa Kimunye	Kirinyaga	1.185	283,776,720
6.	Nyamindi Kimunye	Kirinyaga East	0.520	443,812,038
7.	Maragwa Ikumbi	Maragwa	2.10	293,776,720
8.	Chania Mataara	Gatundu	0.568	86,259,188
9.	Itare Kapkatet	Buret	2.015	324,493,911
10.	Kipsonoi Kapkoros	Bomet	1.655	336,486,158
11.	Kipsonoi Litein	Buret	2.15	622,954,129
12.	Gucha Ogembo	Ogembo	1.18	491,394,675
	Total		15.2	4,383,446,517

The above sites are largely located in tea growing areas and their development will reduce the cost of energy including electricity to tea factories.

Tea factory companies are therefore expected to mobilize resources for their development. Payback periods for these projects range from 1.9 years to 6.4 years, while their respective economic life spans are at least 20 years on average.

In addition to this the Ministry has commissioned feasibility studies for fourteen selected small hydropower sites listed in table 2 below.

Table 2. Locations of Potential Small Hydro Power Sites

	Project Site	District
1	Chemosit/Urith River	Belgut
2	Kiptiget River	Belgut
3	Nyangoress River	Bomet
4	Erdurko Falls	Narok North
5	Wei Wei River	Pokot Central
6	Orobo River	Nandi/Nyando
7	Embombut River	Marakwet
8	Ura Rapids	Meru North
9	Kazita Munyi River	Meru Central
10	Gura Confluence With Tana	Nyeri
11	Thiba Confluence with Tana River	Mbeere
12	Chania River	Nyeri
13	Thiba/Kiringa Confluence	Kirinyaga East
14	Confluence of Maragwa and Irati	Muranga/Maragwa

Feed-in-Tariffs for Renewable Energy Resource Generated Electricity

The Ministry of Energy in May 2008 formulated and has been implementing a Feed-in-Tariffs Policy for wind, small hydropower and biomass resource generated electricity to attract private sector investment in electrical power generation from renewable energy sources as a means of diversifying national power sources, enhancing national energy security, creating employment and income generation. The Feed-in-Tariffs Policy was revised in January 2010 in a bid to facilitate accelerated investment in generation from renewable sources, as well as incorporate other renewable energy resources namely, geothermal, biogas and solar.

A Feed-in-Tariff is an instrument for promoting generation of electricity from renewable energy sources. It allows power producers to sell and obligates the distributors to buy on a priority basis all renewable energy sources generated electricity at a pre-determined fixed tariff for a given period of time.

Its objectives 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 by eliminating the conventional bidding processes; and
- c) encourage private investors to operate the power plant prudently and efficiently so as to maximize its returns.

The power grid connections tariffs applicable are indicated in the table below.

Technology Type	Plant Capacity (MW)	Maximum Firm Power Tariff (\$/kWh) at the Interconnection Point	Maximum Non Firm Power Tariff (\$/kWh) at the Interconnection Point
Geothermal	Up to 70	0.085	-
Wind	0.5-100	0.12	0.12
Biomass	0.5-100	0.08	0.06
Small Hydro	0.5-0.99	0.12	0.10
	1-5	0.10	0.08
	5.1-10	0.08	0.06
Biogas	0.5-40	0.08	0.06
Solar	0.5-10	0.20	0.10

Nevertheless, all undertakings shall be subject to the provisions of section 27 of The Energy Act, 2006.

Subsection (1) stipulates that a license shall be required for:-

- a) generation, importation or exportation, transmission or distribution of electrical energy; or
- b) supply of electrical energy to consumers.

However provided that for undertakings involving capacities not exceeding 3000 kW, the provisions of subsection (2) shall apply.

Subsection (2) of the Act stipulates that a permit shall be required in respect of all undertakings:-

- (a) intended for the supply of electrical energy to other persons or consumers; and
- (b) with a generating plant of over 1000 kW intended for own use.

A permit shall not be required in case of installations with a generating plant of capacity not exceeding 1000 kW and connected within the premises of any person in such a manner that conveyance of electrical energy to a transmission system or a distribution system cannot occur.

Additionally, the economic viability of small hydropower generation plants has attracted other private and communal investors around the country.

In the western region of Kenya the Ministry has already approved development of the following small hydropower plants:

- 1) an estimated 2 MW plant along River Yala at Dominion Farms in Siaya district; and
- 2) 3 MW plant at Teremi Falls on Kuywa River in Mt. Elgon district.

Other projects that have been identified for development include estimated:

- 1) 3.2 MW plant at Sindikho Falls on River Nzoia in Kakamega district;
- 2) 8 MW plant at Brodenck Falls on River Nzoia in Webuye;
and
- 3) 3 MW plant at Foaker Falls on Kepekeren River in Webuye.

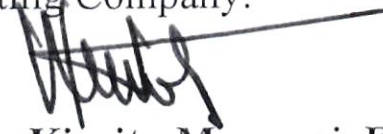
The electricity generated from these small hydropower stations will be dispatched to the national electricity grid under the feed-in-tariff policy to augment the available capacity.

Elsewhere the Ministry has granted approval for the development of three small hydros along River Mathioya in Muranga district namely:

- 1) An estimated 5 MW plant at Kagumoine;
- 2) 5 MW plant at Kairo; and
- 3) 5 MW plant at Njega.

These three power plants are in the process of finalization of negotiations for Power Purchase Agreements (PPA) with Kenya Power and Lighting Company.

So far two small hydropower projects, Imenti Tea factory in South Imenti district and Teremi Falls in Mount Elgon district have signed Power Purchase Agreements (PPA) with Kenya Power and lighting Company.


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