convivium AFRICA

Kenya Project

KERICHO 40 MW DC PV Project

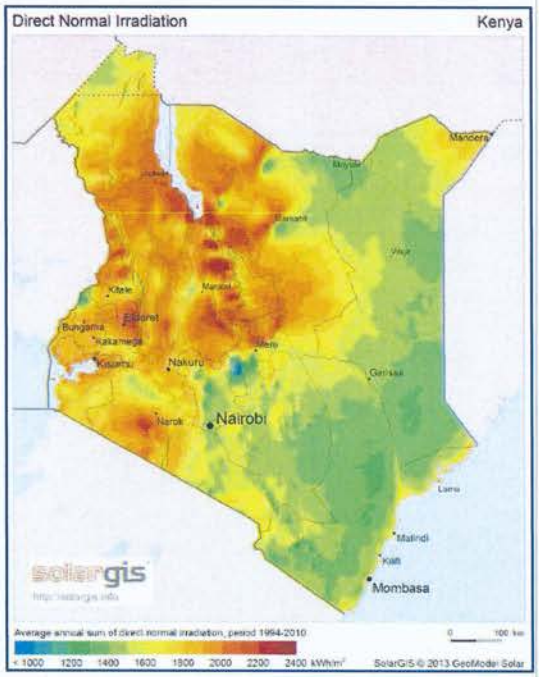
January 2020



Kericho Project Overview

Project Name	KERICHO 40 MW DC PV Project - Kenya
Location	Kericho, Kenya
Coordinates	Latitude: 0.195 S Longitude 35.144 E
Altitude	1340 m a.s.l.
Irradiation	1,730 kWh/m²
Nominal Capacity	40 MWp DC
Connection	Kericho, medium high Voltage : 33/66

PPA [USD$/MW]	75 US $ cents per MWh 20 years. With Kenya Power. COD August 2021.
TOTAL CAPEX [USD$]	Estimated 40.035.000 US $
OPEX [USD$/MW] year	[15k -20k]



Site overview:

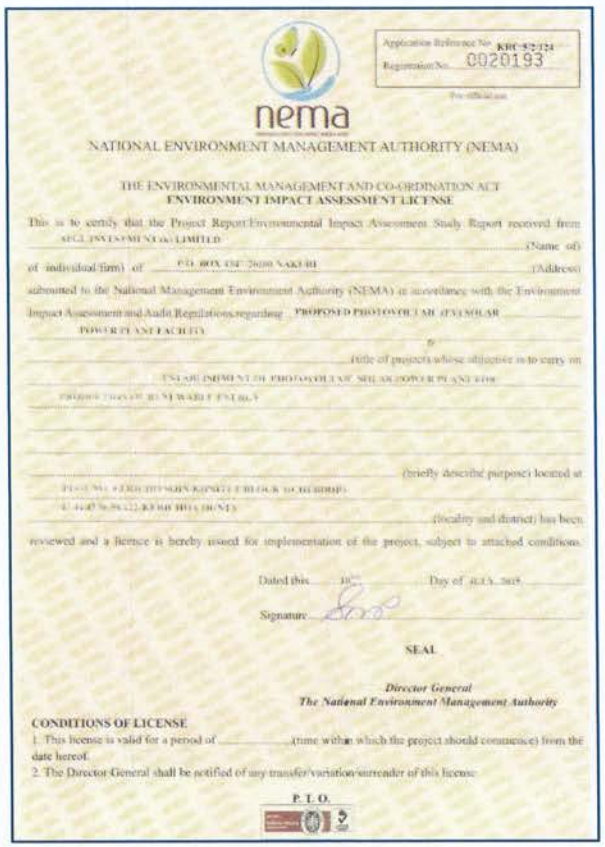
- Dimension of land: 52.6 Ha
- Distance from the power plant to the interconnection cost: 2.5km
- Connection at Muhoroni 132/33kV Substation
- Closer city; Kipsitet (2000 inhab.) is 5 km away, Kaposit 19 km and Kericho (35 000 inhab) 40km.

Kericho Project Description

Permitting process

- Lands have been secured for 138 acree
- EIA (Enviromental Impact Assessment) available
- Study for Grid connection available





nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

Application Reference No. KRC 57/21
Registration No. 0020193

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
ENVIRONMENT IMPACT ASSESSMENT LICENSE

This is to certify that the Project Report/Environmental Impact Assessment Study Report received from ..... (Name of) of (individual/firm) of ..... (Address) submitted to the National Management Environment Authority (NEMA) in accordance with the Environment Impact Assessment and Audit Regulations regarding PROPOSED PHOTOVOLTAIC (PV) SOLAR POWER PLANT FACILITY ..... by ..... (title of project) whose objective is to carry on ..... (briefly describe purpose) located at ..... (locality and district) has been reviewed and a licence is hereby issued for implementation of the project, subject to attached conditions.

Dated this 10th Day of AUG. 2021

Signature .....

SEAL

Director General
The National Environment Management Authority

CONDITIONS OF LICENSE

1. This license is valid for a period of ..... (time within which the project should commence) from the date hereof.
2. The Director General shall be notified of any transfer/variation/surrender of this license.

P. I. O.



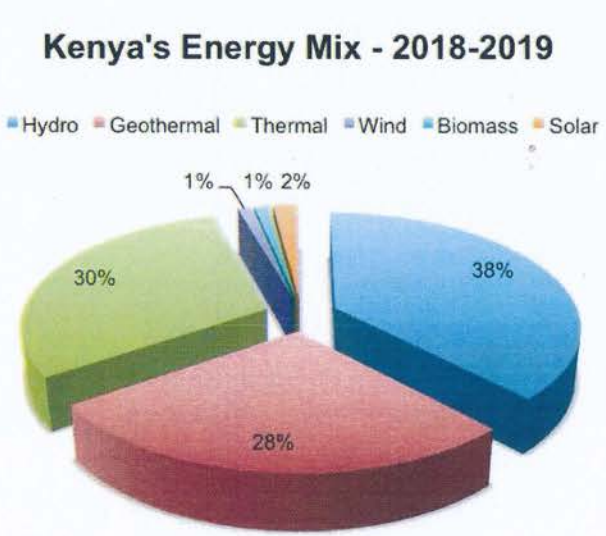
Kenya Country Overview

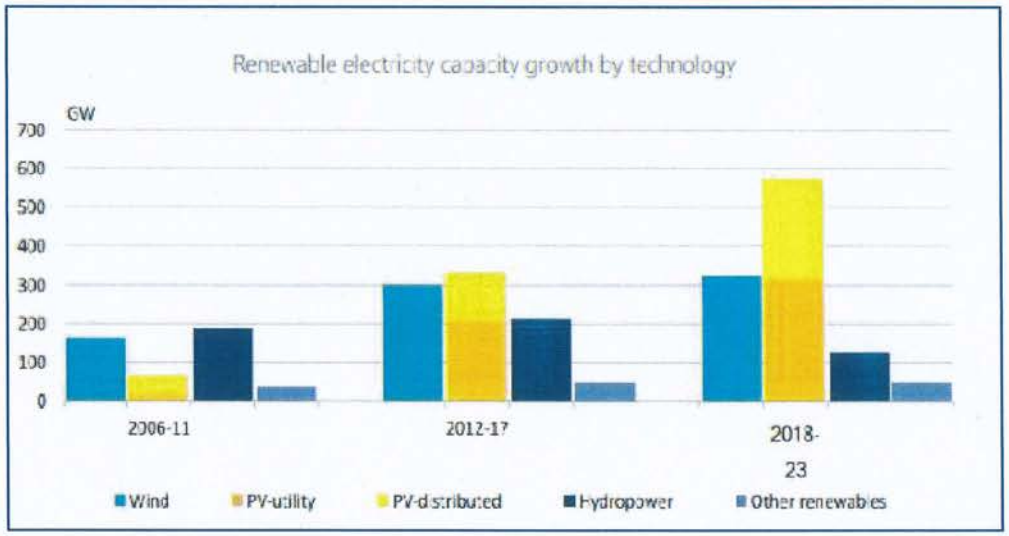
Kenya has promising potential for power generation from renewable energy sources. Abundant solar, hydro, wind, biomass and geothermal resources led the government to seek the expansion of renewable energy generation to central and rural areas. Following a least-cost approach, the government has prioritised the development of geothermal and wind energy plants as well as solar-fed mini-grids for rural electrification.

Kenya has a low carbon and diverse energy mix, with geothermal and hydro power the main sources of electricity supply. The biggest producer is the parastatal Kenya Electricity Generating Company, which accounts for about 74% of the energy consumed, with independent power producers largely contributing the remainder.

Peak demand in 2017/18 was 1,802MW, while installed capacity was 2,351MW.

Electricity consumption has been rising at a compound annual rate of 6.2% since 2012 as more and more households and businesses are connected to the grid. Under its vision for Kenya to become an industrialised and middle income country, the government is aiming for universal electricity access by 2022. Today, some 73% of households have access to electricity through grid and off-grid solutions, compared with just 29% five years ago.





Kenya Country Overview

Kenya's geographical location astride the equator gives it unique opportunity for a vibrant solar energy market.

The country receives good solar insolation all year round coupled with moderate to high temperatures estimated at 4-6 kWh/m²/day. The percentage of solar energy harnessed for 35 3.0.

The demand for solar water heating (SWH) is however, projected to grow to more than 800,000 SWH units by 2020 equivalent to 300,000 TOE. This represents a growth rate of 20% per annum. This demand will mainly be from domestic, institutional and small commercial consumers spurred by the operationalization of the Energy (Solar Water Heating) Regulations, 2012. 3. Kenya has a large-scale market-driven penetration of small PV systems with capacity of 12 – 50 watts power (Wp) consisting of low cost amorphous silicon modules and both mono- and polycrystalline silicon modules.
As at June 2017, the installed capacity for solar energy was at 0.66 MW. By the year 2020, it is projected that the installed capacity of solar photovoltaic systems will reach 100MW generating 220 GWh annually.

The Government initiated a programme for electrification of institutions far from grid using solar PV systems. As at December 2017 solar PV systems had been installed in 4,685 institutions including primary and secondary schools, dispensaries, health and administrative centres. . The Government has embarked on a programme to provide solar/wind hybrid generation capacity to off-grid diesel power stations as detailed below

No.	Off-Grid Station Name	Existing Diesel Capacity (Kw)	Existing Solar Capacity (Kw)	Existing Wind Capacity (Kw)
1.	Mandera	2,000	350	0
2.	Kakuma	800	60	0
3.	Merti in Isiolo.	128	10	0
4.	Habaswein	360	30	50
5.	El Wak in Wajir	360	50	0
6.	Mfangano	520	11	0
7.	Rhamu (Mandera)	184	50	0
8.	Eldas	184	30	0
9.	Takaba	184	50	0
10.	Laisamis	184	80	0
11.	Lodwar	2,000	60	0
12.	Marsabit	2,000	0	0
	TOTALS	**8,904**	**781**	**550**

Solar Energy	Short Term 2018-2022	Medium Term 2018-2026	Long Term 2018-2030
1. Undertake awareness programs to promote the use of solar energy	✓	✓	✓
2. Enforce regulations on standards.	✓	✓	✓
3. Regular review of standards for solar energy technologies and equipment.	✓	✓	✓
4. Provide incentives to promote the local production and use of efficient solar systems.	✓	✓	✓
5. Enforce regulations on building codes on water heating and lightning.	✓	✓	✓
6. Provide a framework for connection of electricity generated from solar energy to national and isolated grids, through direct sale or net metering.	✓	✓	✓
7. Enhance penalties for theft and vandalism of solar systems.	✓	✓	✓
8. Support hybrid power generation systems involving solar and other energy sources to manage the effects caused by the intermittent nature and availability of solar energy.	✓	✓	✓
9. Roll out installation of solar PV systems in all the remaining public facilities in the off grid areas.	✓	✓	✓
10. Procure and distribute solar lanterns to light up rural, peri-urban and urban areas.	✓	✓	✓
11. Undertake RD&D on solar technologies.	✓	✓	✓

Kenya Country Overview

NATIONAL GRID

1. The existing transmission network comprises 1,331 km of 220 kV and 2,436 km of 132 kV lines, and is interconnected with Uganda through a 132 kV double circuit line.

2. As of June 2013, there were nine generation substations with a transformation capacity of 1,846 MVA and forty-five transmission substations with a capacity of 3,076 MVA.

3. The existing transmission system capacity is severely constrained particularly during peak hours. The problem is partly due to inadequate reactive power in major load centres and also transmission constraints particularly in the Western and Nairobi regions.

4. One of the recommendations under Sessional Paper No. 4 of 2004 was to unbundle transmission and distribution functions. This began in 2008 with the establishment of KETRACO as a transmission entity.

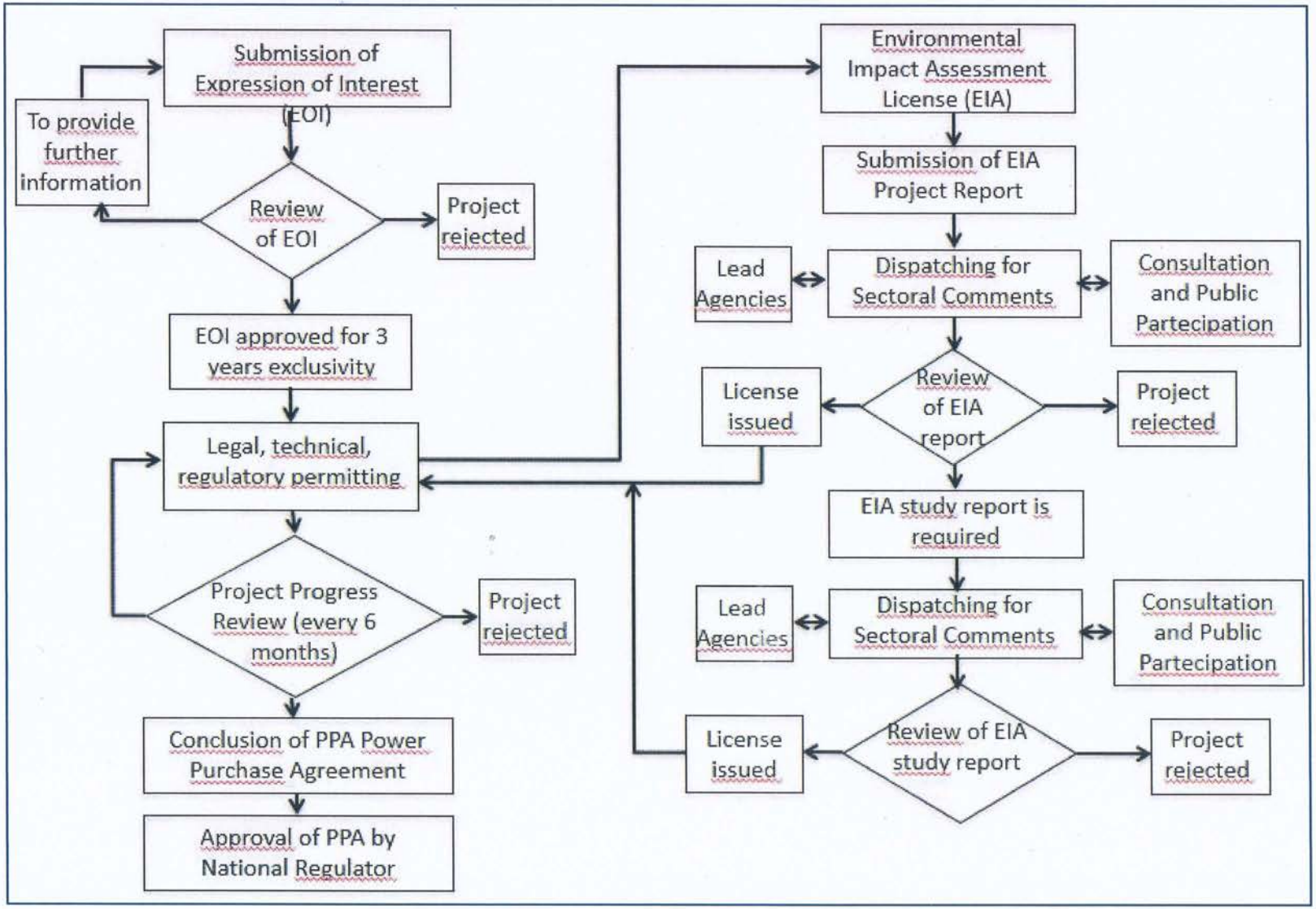
KETRACO

KETRACO was established in 2008 to unbundle transmission from distribution.

As part of its mandate, KETRACO is currently undertaking new transmission projects aimed at developing a robust grid system to enable evacuation of the additional 5,000MW by 2016, which entails construction of the 132kV Menengai – Soilo, 400kV Menengai – Rongai, 400kV Silali – Rongai, 400kV Dongo Kundu – Mariakani, 400kV Lamu – Nairobi East, 400kV Kitui – Nairobi East and the 400kV Isinya - Nairobi East transmission lines.

Kenya Country Overview

FIT and EIA procedures



Kenya Country Overview

Genaral economic info	
Population	48,000,000
State	Presidential republic, universal suffrage
Religion	Christianity 80%
Median age	18.5
Literacy rate	87.4 %
Population growth	2.7%
Political right score (1-7)	4
Civil right score (1-7)	4
Gini Index (0-100)	47.7





Economic indicator	
GDP	79.22 B$
Per Capita GDP (PPP)	3500 $ (187th out of 228)
Debt/GDP	54,2%
GDP growth	4.9%
Inflation	5.5%
Rating (Debt)	B+ (S&P), B1 (Moody's), B+ (Fitch)
Outlook	stable
Change rate KSh/US$	103.8 (October 2019)

Source: tradingeconomics.com and CIA World Factbook