

2030 - 300GW



AREI

Africa Renewable Energy Initiative
Initiative Africaine pour les Énergies Renouvelables

DIGITIZATION OF RENEWABLE ENERGY Case of Kenya



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OUTLINE OF PRESENTATION

- Kenya Background Information - ENERGY
- Digitization of Renewable Energy in Kenya
 - Digital Financing of Renewables
 - Affordability of Renewables Supply
 - Flexibility of Supply – Smart Metering
 - Management of Variable Renewable Energy supply to the grid
- Challenges to digitization

KENYA

Energy Mission & Vision



Mission

To facilitate provision of :

- ✓ **clean,**
- ✓ **sustainable,**
- ✓ **affordable,**
- ✓ **competitive** and
- ✓ **secure energy**

for national development while
protecting the environment ...



Vision

... affordable, **competitive** quality
energy

for all Kenyans ...

POLICIES, ACT AND STRATEGIES

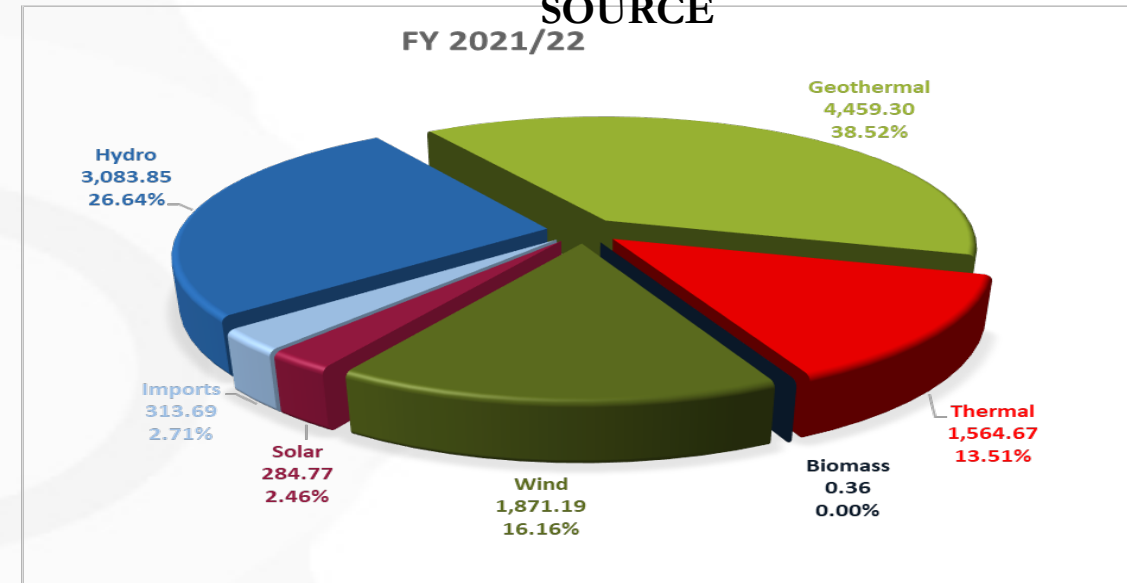
- Kenya Vision 2030
- The Big 4 Agenda
- Energy Policy 2018
- Energy Act 2019
- Kenya National Electrification Strategy 2018
- Bioenergy Strategy 2020
- Kenya Energy Efficiency and Conservation Strategy 2020
- Draft Feed in Tariff Policy - 2021
- Draft Renewable Energy Auction - 2021

INSTALLED ELECTRICITY GENERATION CAPACITY

Kenya has a low-carbon and diverse energy mix

Generation Type	May 2022		
	Installed* MW	Effective* MW	% contribution (Effective)
Hydro	838.1	809.1	27.7%
Geothermal	949.1	871.1	29.8%
Thermal (MSD)	586.3	566.4	19.4%
Thermal (GT)	60.0	56.0	1.9%
Wind	435.5	425.5	14.6%
Biomass	2.0	2.0	0.1%
Solar	170.3	170.3	5.8%
Interconnected System	3,041.3	2,900.4	99.2%
Off grid thermal	31.5	21.3	0.7%
Off grid wind	0.55	0.00	0.0%
Off grid solar	2.3	1.9	0.1%
Off grid System	34.3	23.2	0.8%
Imports	0.0	0.0	0.0%
Grand Total Capacity (MW)	3,075.6	2,923.6	100.0%

PROPORTION OF INSTALLED CAPACITY BY SOURCE



- **Generation capacity** is now 3,041.3 MW
- **Peak demand** – 2051 as of May 2022
- **Renewable energy** share is 78% of installed capacity and 90% of total power dispatched
- **Geothermal** share is close to 50% of total power generation making Kenya one of the global leaders

DIGITAL FINANCING OF RENEWABLES - ACCESS TO CREDIT

Access to Electricity is estimated to be about 75% while access to clean cooking is as low as 35% in Kenya. Made possible by Government last mile programmes. Increase adoption of modern energy has been made favourable due to digital financing where,

- No Collateral is required
- Addressing the kandogo economy. (hand to mouth)
- Growth in digital money platforms such as Mpesa, airtel money etc
- Access to mobile networks and Internet network
- Advancement in digital controls
- Low administrative cost – Reduced physical monitoring

DIGITAL FINANCING OF RENEWABLES – ACCESS TO CREDIT- Examples

- M-KOPA –
 - launched in 2010 with pay-as-you-go (PAYG) solar products targeting mainly the Kandogo Economy. A combine the power of digital micropayments with IoT (Internet-of-Things) connectivity to make credit more accessible.
 - So far \$600 million in credit that has enabled over 1 million customers to access solar lighting and array of electrical appliances.
- The same technic has been employed in biogas. Where installation are done on credit and monitored dignitary. Payments done monthly in small instalments by digital money – eg Mpesa

AFFORDABILITY OF RENEWABLES -

- Supply of Energy – KoKo Ethanol cookstoves
- Prepaid token system for electricity
- Convenience and availability at costs less than a dollar
- Tracking of supply – ethanol is a controlled product in Kenya



FLEXIBILITY OF SUPPLY – SMART METERING

- Prepaid token system for electricity supply

Advance purchase of electricity -kWhs for domestic use for whatever amount of money.

Makes electrical power supply – affordable and conveniently purchased from anywhere using mobile money.

MANAGEMENT OF VARIABLE RENEWABLE ENERGY SUPPLY TO THE GRID

- Variable generations from wind and solar pose challenges to the grid due to variation in power supply to the grid requiring greater flexibility of the grid otherwise may result in interruption of supply
- The challenges can be minimized by digitization of the grid to smart grids to facilitate
 - provision real-time generation data to power system operators;
 - Advance forecasting of wind /solar generation

MANAGEMENT OF VARIABLE RENEWABLE ENERGY SUPPLY TO THE GRID contd

- Dynamic optimization of grid operations and resources
 - Planning of dispatch to suit the forecast
 - Management of reserve generation (Reserve margin)
 - Demand response
 - Smart metering – making it possible to cost power at different time of the day
 - Connecting small VRE to the grid in a well regulated manner – net metering and wheeling
- Reduction of system losses both technical and commercial – high in africa in the range above 12% for most countries. Kenya is 18% WB 2014
- Cost of power – the more efficiently we manage a power grid systems, the less cost passed over to the consumers.
- Control system suitable to facilitate quick response to system challenges

CHALLENGES OF DIGITIZATION

- Basic Infrastructure development
 - Internet
 - Mobile phones network
 - Availability & affordability of the consumer digital devices such as smartphones, smart meters, SCADA etc
- Regulatory framework to protect the industry from
 - Cyber crimes
 - Consumer exploitation
- Financing of Infrastructure
 - Government & Private sector
- Skills development



THANK YOU



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